ARCHIVES OF OPHTHALMOLOGY.

AMAUROTIC FAMILY IDIOCY: HISTOLOGICAL EXAMINATION OF A CASE IN WHICH THE EYES WERE REMOVED IMMEDIATELY AFTER DEATH.

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(With four figures on Text Plates V–VI.)

ALTHOUGH a number of pathological examinations have been made of the eyes in cases of amaurotic family idiocy, there still seems to remain some doubt in regard to the histology of the retinal changes. This is due to the supposition that the changes described may have been dependent, in part at least, upon post-mortem alterations. Holden's explanation of the fundus picture also does not seem to have met with universal acceptance. Thus Parsons,[1] who has himself examined two cases, says in his recent text-book that it is probably due to œdema and in some cases even to a hole in the macula. It therefore seems well to place on record the results of the pathological examination in the following case in which the eyes were removed within fifteen minutes after death. In this case the only demonstrable changes in the retina were confined to the ganglion cells, which were markedly degenerated. Since the life of

[1] J. Herbert Parsons, *The Pathology of the Eye*. London, 1908, vol. iv. References to the authors mentioned in this paper may be found here. A recent paper not included by Parsons is by Cohen and Dixon, *Jour. Amer. Med. Ass.*, 1907, May 25, p. 1751.

the patient was unusually prolonged, to the age of three years, it would seem that if other changes ever occur they should have manifested themselves here. It is clearly evident, therefore, that the ophthalmoscopic picture of this disease is due to degeneration of the retinal ganglion cells about the fovea, and to the contrast thereby produced, as originally maintained by Holden.

For the opportunity to make the pathological examination in this case I am indebted to Dr. Alexander Quackenboss of Boston, under whose care the patient came, and who obtained the necessary permission from the parents. A clinical description of the case has already been published by Dr. Quackenboss[1] which for the sake of completeness is quoted here in full.

"INFANTS' HOSPITAL. *November, 1905.* Joseph C., aged eighteen months, born of Jewish parents. First child. Family history negative. Previous history: Breast-fed eight and one-half months. Child got along all right to the third or fourth month, then seemed to develop slowly; at eight months of age was not considered bright mentally. Has never sat up or attempted to stand or walk. The parents were unable to tell whether child could see or not. For past three weeks there has been a marked twitching of the face.

"*Physical Examination:* Under developed and nourished; very flabby skin; fair color; slight cyanosis of lips. Unable to hold up head. Fontanelle ¾ *cm* but not tense, rather depressed. Cervical glands enlarged; no sign of rickets; incisor teeth, four upper and two lower. No evident paralysis of face or extremities; legs kept extended, resist attempt at flexing, but after rigidity is overcome, very flaccid. Unable to make out patella reflex. No ankle clonus. Heart, lungs, liver, and spleen negative. Urine turbid; acid; no albumin; no sugar; 1.030. Lumbar puncture negative.

"Examination of eyes reveals grayish-white patch, with brownish-red centre, in the macula region of each eye. Optic atrophy. Pupils large and react. While in the hospital this child had to be fed with a tube."

The patient was afterwards admitted to the Eye and Ear Infirmary, where he remained most of the time for a

[1] A. Quackenboss, "Amaurotic Family Idiocy: A Report of Four Cases." *Boston Medical and Surgical Journal*, 1906, March 1st, p. 238.

period of eighteen months. During this time he was fed by means of a stomach tube, to which was no doubt due the fact that his life was unusually prolonged for such cases. Although his bodily condition actually improved, mentally he became progressively worse. Death occurred July 6, 1907, apparently from pneumonia, at the age of three years. Dr. Quackenboss informs me that since he reported the case, two more children have been born to the parents, only the second of which shows the characteristic markings of the disease.

PATHOLOGICAL EXAMINATION.

The eyes were removed within fifteen minutes after death. One was placed immediately in 10% formalin, where it remained four days, and was then opened and the fundus photographed. The other was opened by an incision just anterior to and parallel with the ora serrata, and then fixed in Zenker's fluid for 24 hours. Portions of the retina near the macula were removed from the formalin-hardened specimen and some of them treated with Marchi's fluid and others mordanted by Weigert's method for myelin sheaths. Portions of the optic nerve were treated in the same way.

The globes were normal in shape and of equal size, each giving the following measurements: antero-posterior, 22.5*mm;* horizontal, 23.5*mm;* vertical, 23*mm*. The corneæ were perfectly circular instead of elliptical, and each measured 11*mm* in diameter. The lens hardened in formalin measured 8.5*mm* in diameter. On opening the eyes each fundus is found to show the same picture previously seen with the ophthalmoscope (Fig. 1). The white area representing the macula is horizontally oval in shape and 2.25*mm* x 3*mm* in size. The dark spot in the centre is ½*mm* in diameter. On placing a piece of white paper behind the macula of the eye fixed in formalin, the dark spot either completely disappears or is converted into a white spot according to the illumination.

Histological Examination: Fixation as already described. Embedding in celloidin. In the case of the eye fixed in Zenker's fluid, sections were made passing longitudinally through the optic nerve and exactly through the centre of the fovea. A portion of each optic nerve was also cut in cross section. Staining in hematoxylin and eosin, iron

hematoxylin, van Giesen's stain, differential elastic tissue and myelin sheath stains, thionin, Mallory's phosphotungstic-acid-hematein and connective-tissue stains.

On microscopic examination the only pathological changes found are confined to the retina and optic nerve. The ciliary muscle is flatter and shows fewer circular fibres than usual, suggesting myopia. With the exception of the ganglion cells the retina is perfectly normal. Not a single normal ganglion cell is to be seen, the cells being affected even as far forward as the ora serrata. Cells in the various stages of degeneration described below occur in all parts of the retina except the macula, where only the most advanced stages are met (Fig. 3). The amacrine and other ganglion cells in the internal nuclear layer show the same changes as the other ganglion cells.

The degeneration of the ganglion cells is brought out by any of the staining methods used, but the various changes are most plainly shown by Mallory's connective-tissue stain after fixation in Zenker's fluid. The following description therefore applies to sections stained by this method.

For convenience of description the changes may be divided into several stages, although all intermediate gradations are seen. The condition of the nucleus is taken as the guide to degree of degeneration.

(1) The least marked change in the ganglion cells consists in the cytoplasm staining blue in color without being hyaline, while the nucleus and nucleolus remain apparently normal. The blue coloration involves uniformly the whole cytoplasm or is confined to a part of it. The nuclei are displaced to one side, but this is normally the case. The Nissl bodies have completely disappeared, as have also apparently the cell processes. The retinal neuroglia is condensed about the cells and often closely invests them with unusually well marked membranes.

(2) In the next stage the cytoplasm is bluer and also hyaline, while the cell is enlarged and rounded in shape. The nucleus shows shrinkage and the nucleolus is sometimes unrecognizable. The reticular network of the cytoplasm, connecting the nuclear and cell membranes, is distinctly visible, stained red, and shows dots, variable in size, at the junction points

of the network. Fusion of contiguous cells in the same or different stages of degeneration sometimes occurs, giving the appearance of one large cell with two nuclei.

(3) The nucleus is still more shrunken and stains more deeply but not diffusely, while the nucleolus is sometimes present, sometimes not. The cytoplasm has lost its hyaline appearance and now consists of balls which stain blue but less intensely. Occasionally one of the balls is as large as the nucleus, but is usually only a little larger than a nucleolus. The cell reticulum is less distinct or is not seen, and there appear in the cytoplasm two or more round refractile dots or rods staining bright orange. These are about half the size of a nucleolus. Similar dots are also sometimes seen connected with the chromatin network of the nucleus, which may indicate the origin of all of them.

(4) In the last stage the cell membrane is lost and all that remains of the cytoplasm is a diffuse mass of bluish or slightly reddish material which sometimes still contains some of the refractile dots. The latter are also sometimes seen outside the masses. The diffuse masses of cytoplasm are often apparently shrunken, probably due to the action of the fixing agents, leaving clear spaces around them. The nucleus is more distorted and stains more deeply and diffusely. Its outline then becomes indistinct, the nuclear substance stains less intensely and shows indistinct vacuoles. Finally all trace of the nucleus is lost.

No evidences of cell division are seen in any of the stages.

The differential stain for myelin brings out the cell reticulum to some extent and stains the balls into which the cytoplasm breaks up in stage 3. It also brings out the refractile dots. The hyaline stage is not well shown by this method. Marchi's method fails to show fat in any of the cells and does not bring out the details of the degenerative changes. The hyaline substance into which the cytoplasm is converted in stage 2 does not stain in alum hematoxylin, eosin, or acid fuchsin.

THE OPTIC NERVE.

The optic-nerve entrance presents the asymmetrical appearance considered characteristic of myopia (Fig. 2). There

is also an indication of the so-called supertraction of the retina observed in myopia. There is no atrophy of the choroid either at the disk margin or elsewhere. In the disk the neuroglia cells are unusually abundant. Within the disk and also in the nerve stem there are many so-called cytoid bodies. When stained in Mallory's connective-tissue stain these often closely resemble the degenerated ganglion cells of the retina.

Weigert's myelin sheath stain shows complete degeneration of the temporal portion of the nerve. In the nasal portion some of the sheaths stain, but not with normal intensity. Marchi's method shows degenerative changes throughout the nerve. The central retinal vessels are normal.

THE BRAIN.

Through a misunderstanding a general autopsy was not performed, but the brain was removed after 48 hours and preserved in formalin. The body was fairly well nourished and measured 89*cm* in length. The skull was 6.2*mm* thick at the vertex. The brain weighed 1530*gms*, and was much firmer than normal. The pia arachnoid showed only post-mortem changes. On sectioning the brain after hardening in formalin, nothing noteworthy was found. There was not the slightest indication of hydrocephalus.

On microscopic examination of a portion of the cortex, changes similar to those in the retinæ are found. No normal nerve cells are to be seen and in most of the cells the degeneration is far advanced. Sections stained by a differential stain for myelin show the highly degenerated cells in a striking way (Fig. 4). The less advanced stages are best shown by the connective-tissue stain but not so well as in the case of the retinæ, owing no doubt to post-mortem changes. The refractile granules observed in some of the retinal ganglion cells are not seen. The neuroglia is normal. Marchi's method shows no fat in the nerve cells, but fat granules are found in the walls of the blood-vessels in the gray matter. Fatty granule cells are abundantly present in the white matter. In the portion of the brain examined the myelin sheaths of

the white matter show complete degeneration by the Weigert method.

REMARKS.

The pathological changes in the eyes were confined to the ganglion cells of the retina and the fibres of the optic nerve. All of the retinal ganglion cells were degenerated to a greater or less degree, but those in the macula were most profoundly affected, thus corresponding with the degeneration of the optic nerve, which was most marked on the temporal side. No hole was found in the macula as described by Parsons. That the dark spot in the macula was due to contrast was positively shown by the procedure of placing a piece of white paper behind it, this causing the spot to disappear. The retina showed no gliosis. There was also no degeneration of the rods and cones and no undue tendency of this layer to adhere to the pigment epithelium as described by Shumway and Buchanan. In their case the adhesion was probably due to post-mortem changes, for in eyes removed some time after death it is the rule for the rods and cones to adhere strongly to the pigment layer. There was absolutely no œdema of the macula, contrary to the findings of Treacher Collins and Mohr.

The nature of the hyaline material formed by the ganglion cells at one stage of their degeneration was not determined. That it was not ordinary fat was shown by the Marchi method. On the other hand, its failure to stain in alum hematoxylin, eosin, or acid fuchsin shows that it does not belong to the substances usually known as hyalin, colloid, or amyloid. The changes found in the brain corresponded with those in other reported cases.

The character of the optic-nerve entrance, while of no direct significance in regard to the degeneration of the ganglion cells, was of considerable interest in another connection. Although the eyes were not myopic, the optic nerve entrance presented the appearance regarded as characteristic of myopia. It would seem, therefore, that this condition of the optic-nerve entrance is not necessarily the result of myopia but may be inherited along with a tendency towards the latter.

ILLUSTRATIONS.

FIG. 1. Photograph of fundus after fixation in formalin. Magn. x 3.

FIG. 2. Photograph of section showing asymmetrical character of optic-nerve entrance. Magr. x 8.5.

FIG. 3. Photograph of section passing near the centre of the macula, showing marked degeneration of ganglion cells. Mallory's connective-tissue stain. Magn. x 87.5.

FIG. 4. Photograph of section of brain cortex showing numerous nerve cells stained black, in advanced stage of degeneration. Myelin sheath stain. Magn. x 68.

A CYSTIC FORMATION BY THE PARS CILIARIS RETINÆ FOLLOWING A PERFORATING WOUND IN THE CILIARY REGION.[1]

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WITH A REPORT OF THE HISTOLOGIC FINDINGS.

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Clinical History.—A young man, a locomotive engineer, came to the Hospital on October 10, 1908, with a statement that while attending to his engine that morning the lubricating glass blew out, fragments of which struck him in the face. On examination the lids of the left eye were seen to be contused, and the globe perforated. The perforating wound passed through the ciliary region, extending obliquely from a point about *4mm* from the vertical meridian on the nasal side of the globe upwards to near the vertical and about *3mm* above the horizontal meridian. The edges of the wound were straight cut, but uveal tissue bulged into the lower angle. There was a shallow hyphæma. The sheet of the iris was not cut and the pupil was round. A strong solution of eserin was instilled, which caused a marked contraction of the pupil and the withdrawal of some of the tissue in the wound. The lens was not at all, or but slightly, damaged. The fundus could not be seen through the œdematous cornea.

It was presumed that a fragment of oily glass had lodged in the globe and a guarded prognosis was given; and the gravity of the case was explained to the man. He at first refused to accept the verdict, but later returned to the Hospital and was placed in bed; ice compresses were applied

[1] Read at Wills Hospital Ophthalmic Society meeting, Jan. 5, 1909

constantly; atropin solution was instilled and fractional doses of calomel administered.

After ten days the lips of the wound were still ununited, though the corneal œdema and the hyphæma had disappeared. With the mirror one could see a large and quite broad track or band of lymph extending from the lower angle of the wound across the vitreous to the temporal side of the globe.

The right eye appeared to be entirely healthy, yet the patient complained of discomfort in it. Enucleation of the wounded eye was advised, which decision was concurred in by several members of the Staff who were consulted.

On October 22d, the globe was enucleated. During the manipulations, a clear amber-colored mass forced its way through the imperfectly closed wound. To the bystanders it appeared to be the crystalline, for it was about the size and shape of a lens, but it was so compressible that I believed it to be a cystic protrusion from the vitreous.

The adhesions about the globe were many and dense. The flow of blood was quite free, and at the severance of the nerve there was a copious hemorrahge.

The patient was discharged from the Hospital after four days. The socket has since healed and the man wears a glass eye. The vision of his right eye is $\frac{1}{8}$, and he has returned to work.

The globe was dissected after the removal of it. No signs of union of the wound were seen, and no particles of glass were found. The ciliary processes were deeply infiltrated, and there were streaks of lymph stretching through the vitreous. The retina was thickly œdematous, and for an hour after the ball had been removed the blood-vessels remained engorged and distended. The nerve head was swollen and the macula was quite distinct.

Microscopic Examination.—All the layers of the cornea are intact. The surface cells are granular in character and are covered with a fine detritus. The endothelial cells have proliferated, and at the corneo-scleral junction, on one side of the section, the spaces of the substantia propria are somewhat infiltrated with polynuclear leucocytes shading off toward the anterior pole.

The anterior chamber is normal in depth and the spaces at the angles are somewhat engorged. On one side of the section the iris and ciliary processes show early cicatricial

changes and proliferation of the endothelium and infiltration with polymorphonuclear leucocytes. The pupillary tip of the iris lies in contact with the anterior capsule of the lens, where it is held by a thin reticular exudation consisting of a well marked band composed of leucocytes and fine dark-brown pigment granules. This band extends completely across the pupillary area, touching the lens capsule at various points, to the opposite iris, where it seems to split and encapsulate this body.

The lens is cataractous; the external fibres have been artificially detached, but the capsule is entirely intact. The choroid is highly atrophic; the supra-choroidea is broken up and its endothelium degenerated. The pigment connective-tissue cells are inconspicuous, but the non-pigmented cells of the internal layers show evidences of proliferation and there is also a fine scattering of leucocytes in this region.

The retina is firmly attached; there is marked proliferation of the pigment epithelium, with cystic changes and thickening of the nerve-fibre layer. There is a leucocytic infiltration of the episcleral tissues on this side of the section.

On the opposite side there is a perforating wound at the corneo-scleral margin which has severed the root of the iris at its attachment to the ciliary body, thus setting the iris free in the aqueous chamber except at the point where it is attached to the lens capsule and the strip of exudation already described. This portion of the iris is wrinkled, which contributes to the general thickening caused by the proliferation of the endothelium and retinal pigment layer. Epithelioid cells are present here and also polymorphonuclear leucocytes with diversely arranged pigment cells. The same condition is noted in the ciliary body and the same character of cell structure is shown with the addition of giant cells. There is a large hemorrhage in the muscle layer, and a large mass of free blood on the internal surface. The lips of the wound at both extremities are thickened, the connective-tissue cells are proliferating, and mononuclear leucocytes and new blood-vessels are seen.

Passing through the wound is a fine reticular substance forming with the pars ciliaris retinæ a cyst-like structure. The cyst has two layers: the external, formed by the substance just described; and the internal, formed by the pars ciliaris retinæ. This internal layer appears to be so stretched out that it seems several times longer than one would expect the amount of area involved could be. This retinal membrane lies folded upon itself several times and by its continuation through the wound passes over the surface of the blood clot on the ciliary process, and takes

its normal position posterior to this mass. The reticular structure is made up of a fine granular material. It seems to have been pushed through the wound by some force operating from within. Externally it reaches well on either side of the wound so that it completely covers the opening. This membrane is continuous through the wound with a similar substance spread out over the internal surface of the wound and the posterior surface of the lens, and it passes close to the root of the iris. Within the globe the structure of the membrane is well enough marked to show that it is formed by a modification of the vitreous, which body has shrunk and completely covers the posterior capsule of the lens.

It would not be wrong to say that the two lips of the wound are healed, though they are not united by at least a millimetre, for they are kept apart by the walls of the cyst. The only explanation for the production of the cyst that occurs to me is that the first factor was perhaps the hemorrhage on the internal surface of the ciliary body. This old blood clot tore up the pars ciliaris retinæ and left a space which has been filled by the products of inflammation and the fluids from the disorganized blood. An intraocular force sufficient to increase this tear pushed the membrane ahead of it and ultimately forced it through an external opening. This force doubtless continued for some time as indicated by the unhealed wound. Leaking also took place through the wound, which shows that the force was in this direction; and because of a sudden giving way of the imperfectly closed outlet the confined forces caused the extrusion of the cyst.

This supposition is further borne out by the separation of the individual cells which has been caused by the stretching of the retinal membrane, and, further, the normal channels for the exit of fluids were blocked off by the band of exudation which filled the pupillary area and by the sheet of modified vitreous. Consequently the drainage and leaking could be effected only through the wound and accordingly the greatest force tended in the direction of that region.

Clinically, the most important points to be observed are: the rather long time in which the wound continued unhealed in spite of the quiescence of the external inflammatory symptoms, and the early date at which the sound eye manifested signs of sympathetic irritation.

Pathologically, of particular note were the development of

the strange cyst, which, as the histologic study discloses, contributed to the failure of the union of the wound; the formation of streaks of exudation in, and the degeneration of the vitreous; and the absence of particles of glass.

Of further importance was the very rapid destruction of the retina and choroid in so short a period of time. And it is interesting to note the relation existing between the early manifestation of symptoms of sympathetic irritation and the finding of newly formed epithelioid cells in the ciliary tissues.

KERATITIS PUNCTATA SUPERFICIALIS, WITH REPORT OF A CASE.[1]

By Dr. M. WIENER, St. Louis.

IN 1901 Major Herbert, of Bombay, reported before the British Medical Association a new form of superficial punctate keratitis, which he found very prevalent at the close of the rainy season—especially so in cold and the early hot weather. He describes the spots appearing on the cornea as minute and only slightly opaque, and needing to be stained with fluorescin to be clearly seen. They appear slightly raised, but some are really depressions in the epithelium more than filled with lachrymal fluid. They often collect in the centre of the cornea in the later stages and may there form a ring flattened from above downward. Fluorescin staining lines or patches may be found in the terminal stage. There is usually a slight ciliary or conjunctival injection, with sometimes a tendency to form small follicles on the upper tarsal membrane. There is generally some thickening of the limbus, which aids in the detection of the cases. The disease is seen in young adults mostly and almost invariably only one eye is affected.

Scrapings of affected epithelium show collections of encapsulated bacilli, numerous and closely packed. The bacilli were short with rounded ends and colored only slightly by Gram's method.

Devereux Marshall did not think that the organism described necessarily caused the disease, nor did W. H. Jessop feel sure of the organism shown.

In further notes published by the same author of this

[1] Read before the Ophthalmic Section, St. Louis Medical Society.

disease, he reports an epidemic in October, 1905, in which these cases formed one-fourth of the total out-clinic attendance. He was unable to learn much about the encapsulated bacillus as it failed to grow on ordinary media, as well as owing to its feeble staining powers. Gram's method stained it best but left a considerable area at one end of the capsule unstained. He found a few apparently empty capsules.

Axenfeld demonstrated before the Ophthalmologische Gesellschaft, in 1905, the intra-epithelial bacilli. He found them extremely difficult to stain, appearing only occasionally in an overstained Gram preparation. He thinks that their great number in the epithelium, the regularity of the findings, and the difference between these bacilli and all others ordinarily found in the eye, make their etiology for this keratitis punctata superficialis very probable, although he was unable with different culture media and methods to cultivate them. The bacilli were about 3μ long and 1 to 1½ broad, only the strong capsule showing.

The superficial punctate keratitis described by Fuchs begins with symptoms of acute conjunctivitis. The changes in the cornea may appear at this time or not until some days or weeks afterward. The changes consist of the presence of minute gray spots, which are often arranged in groups or short rows. They vary from ten to twelve in number to one hundred or more. They are scattered irregularly but chiefly in the centre. The spots lie in the superficial layers of the cornea, which look dull because the epithelium over the spots bulges out in the form of a nodule.

The irritative symptoms disappear, but the spots, as well as the punctate look of the cornea, generally remain for months and then gradually disappear. Disturbance in vision depends upon location of the spots. The disease occurs mostly in young people; either one or both eyes may be affected.

The pathologic histology of the superficial punctate keratitis of Fuchs, or subepithelial keratitis of Adler has been studied by Wehrli, who reports two cases in which he removed portions of the corneal epithelium and subjected them to microscopic examination. He found chiefly a lymphocyte invasion, principally of the deeper layers of the epithelium,

with small round-cell accumulations, and also swelling of the fixed corneal cells in the superficial layers.

Dimmer's nummular keratitis resembles Stellwag's well-known type of this disease, which is a variety of the superficial punctate keratitis of Fuchs, only being larger in the latter and deeper in the former, with iritic complications.

Jackson describes keratitis punctata superficialis as being closely allied to herpes and associated with symptoms of acute catarrhal conjunctivitis; several days later minute gray dots appearing, mostly in the central portion of cornea.

According to Nuel, the diffuse inflammation is caused by an œdema in the anterior corneal lamellæ. The spots are produced by filaments of fibrin undergoing hyaline change, which appear in contact with the fixed cells of the cornea. At the level of these areas there is an œdema of the epithelium in the form of knob-like projections that are transformed into epithelial lacunæ. In other words, superficial punctate keratitis is an inflammatory œdema of the anterior corneal planes due to exogenous (epithelial) infection by a not well identified coccus (staphylococcus, according to Valude).

De Schweinitz describes keratitis punctata superficialis (keratitis subepithelialis centralis, keratitis maculosa, noduli corneæ, relapsing herpes corneæ) as probably akin to the herpes-like corneal inflammations. It generally begins with a sharp conjunctivitis of which the secretion is watery and an associated catarrhal inflammation of the upper respiratory tract. In a few days numerous small linear or punctiform spots appear, not immediately beneath the epithelium, but below Bowman's membrane. Cornea between these spots is hazy and contains small points and gray lines radiating out like fine fissures in ice. The disease is tedious, may last for months, is usually bilateral in young individuals. Cause unknown except that it is usually associated with catarrh of air passages. Anatomic nature, probably enlarged corneal corpuscles.

On November 5, 1907, Miss B., aged twenty-one years, came to me complaining of a sense of irritation in right eye and of constant tearing. She was wearing: R + 0.75 D, cyl ax 0; L + 0.5 D, cyl ax 75°; prescribed by me about seven months before. Visual acuteness, right, was

$\frac{1}{1}\frac{1}{1}$; left, $\frac{1}{1}\frac{1}{1}$; whereas it had been $\frac{1}{1}\frac{1}{1}$ in either eye at the time of fitting of the glasses. There was slight injection of conjunctiva right, with a little roughness of the palpable conjunctiva of the upper lid. On close inspection with oblique illumination, the cornea was seen to be studded with numerous small round grayish dots, about thirty in number, averaging about 1*mm* or less in diameter and raised above the surface of the cornea. These could only be seen by oblique illumination or under most favorable reflection in daylight. These spots were located mostly in the centre of the cornea and seem to lie in the most superficial layers of the cornea, involving only the epithelium or the epithelium and most superficial part of Bowman's membrane. The spots were not sufficiently opaque to interfere at all with a view of the fundus, which appeared normal. Left eye was in every way apparently normal. The eye was cocainized and scrapings taken from a couple of these little elevations, and one gelatine and one agar tube inoculated. The tubes remained sterile.

An antiseptic solution was given the patient to drop in the eye at home, and an aseptic powder was dusted into the eye at first daily and then less often; also cold applications used to reduce the conjunctival irritation. The elevated spots seemed to disappear rapidly enough, but left grayish dots which yielded more slowly to treatment. On January 3, 1908, scarcely a trace of these dots could be seen, and on January 18th, when the patient was again seen, the cornea was perfectly clear, with a visual acuteness of $\frac{1}{1}\frac{1}{1}$.

This case answers the description of those cases reported by Major Herbert, of Bombay, more closely than the superficial punctate keratitis reported by Fuchs. Also, those of Herbert were mostly in young girls, as in this case, and mostly monocular. It must be rare in these parts, as neither my associate, Dr. Wolfner, in his wide experience, nor myself had ever seen a case answering exactly this description.

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A CASE OF INTERVASCULAR ENDOTHELIOMA OF THE ORBIT.

By Dr. B. WATANABE, Tokio, Japan.

(*With two illustrations on appended Plate XXI.*)

Abridged Translation from the German edition for October, 1907, by Dr. Matthias Lanckton Foster.

ANGIOMATA of the orbit are rare. Berlin collated from the literature down to 1878 54 cases, but considered some of them to be doubtful. In the Universitaets-Augenklinik at Leipsic between 1891 and 1905 only 8 cases were met with among 138,000 patients; these have been reported elsewhere. I now wish to call attention to a case which in my opinion is of special interest clinically, therapeutically, and anatomically.

Helene K., six months old, was brought to the clinic October 25, 1904. Her mother stated that the child had had ever since birth a bluish swelling of the right upper lid which had increased in size for some months past and became more marked on pressure and on crying.

The child was strongly built, apparently healthy. The right upper lid was much swollen and covered the upper half of the cornea. There were several distended veins in the skin of the lid. The entire lid presented a slight bluish violet discoloration. Gentle palpation gave the sensation of fluctuation, by firmer palpation a convolution of vascular loops could be felt in the orbit. When the child cried the lid swelled considerably and the consistency of the tumor increased, while at the same time the eyeball was caused to protrude several millimetres from the orbit. Investigation of the fundus, which was difficult, revealed normal conditions of the optic nerve and retina. The eyeball was pressed somewhat inward and downward by the tumor, but there was no real restriction of its mo-

bility. The diagnosis of a vascular tumor of the lid and orbit was unquestionable. It appeared to be situated not in the retrobulbar tissue, but in the upper, outer part of the orbit.

The tumor was extirpated Nov. 1, under chloroform. An incision was made in the brow and the tumor laid bare by blunt dissection. It was found to lie in the outer, upper part of the orbit and to become smaller as it went deeper, where it was mobilized as far as possible and removed between two double ligatures. It appeared to have been extirpated almost in toto. The hemorrhage was slight and was checked by ligature. Healing took place by primary union.

On the 10th the lid could be raised so as to uncover the pupil, the eye was in its primary position, exophthalmos could no longer be produced by crying, and the child was discharged.

Nearly a year later, October 18, 1905, the mother brought the child again to the clinic and stated that for some months the eye had again protruded.

Examination showed a slight swelling of the upper lid and distinct protrusion of the eyeball, which was dislocated somewhat downward and inward while its movements were restricted, especially upward and outward. The pupil reacted promptly, the fundus was normal. Crying caused the exophthalmos to increase markedly. The upper lid at the same time became more swollen, but to no such degree as before the operation. A soft tumor could be felt in the upper, outer part of the orbit, evidently a recurrence of the angioma which had originated from the remains of the tumor which had not been removed from the orbit at the operation.

In order to obtain freer access to the orbit Kroenlein's operation was performed. Then it could be seen that the bluish tumor could be sharply distinguished from the neighboring tissue, and by its contrast with its surroundings it gave the impression of a malignant growth. It was extirpated as thoroughly as possible with protection of the eye muscles and of the optic nerve. The external rectus was divided and secured by a loop of thread. The hemorrhage was greater than at the first operation, but was controlled by deep ligatures. Primary union followed and the child was discharged November 13, 1905.

On November 29th the right palpebral fissure was still somewhat contracted, the eye was in its primary position, and there was no exophthalmos. From the macroscopical appearance of the tumor and from the impossibility of exposing and removing it in one piece a recurrence seemed

very probable, but has not as yet occurred. On February 28, 1907, nearly a year and a half after the second operation, the child was brought to the clinic in reply to inquiries.

The right eye was perfectly normal and did not protrude when the child cried. The cosmetic effect of the operation was satisfactory. The right palpebral fissure was only a little narrower than the left on account of a slight drooping of the right upper lid. The eyeball was in primary position and accompanied the movements of the left eye freely in all directions. The pupil reacted promptly. The fundus was normal.

The tumor removed at the first operation was of about the size of a small walnut, of bluish color, fairly soft consistence, and with a nodular, uneven surface. It was divided anatomically into three parts which were not sharply distinguishable but blended into each other. In the central part, which had the greatest circumference (see Fig. 1a), the tumor was composed of numerous vessels, most of which were cut directly across with a few cut obliquely or longitudinally. The typical picture of a cavernous angioma was presented with the difference only that the vessels, which were filled with red blood corpuscles and lined with a single delicate layer of endothelium, were not separated by a scanty stroma of connective tissue, but by cells of endothelial character closely packed together. These intervascular cells corresponded in their size, form, and the staining of their nuclei to the endothelium of vessels, and as they surrounded the vessel walls they gave the impression with the low powers of a deposit of several layers of endothelium on the vessel wall itself. Yet with the higher powers it could be readily seen that these cells lay between the vessels in a fine connective-tissue stroma.

The lobulated construction of the tumor could be well followed microscopically. The lobules were usually round or triangular with rounded angles. They produced the condition that bands of connective tissue of varying breadth radiated into the tumor and formed connections with each other, which caused one to be reminded in a certain way of the lachrymal gland, although glandular lumina were not demonstrated in its principal part. The vessel walls were delicate throughout and presented nowhere endothelial thickenings or signs of hyaline degeneration. Neither were thrombi present or signs of calcification in the lumen of the vessels.

Toward the periphery and toward the orbital tissue, which could be recognized as such by its fat cells, the nature of the tumor changed (see Fig. 1b). The lobulated

construction remained, but the number of vascular spaces gradually decreased until finally in several peripheral lobes endothelial cells remained almost alone. If such a place alone should be taken into consideration the tumor would have to be diagnosticated beyond doubt as a round-celled sarcoma. The partly atrophic orbital fat penetrated here between the lobules of the tumor and separated them more from each other. In the fat were numerous well filled blood-vessels, arteries, and veins, which sent branches between the lobules of the tumor, but did not form cavernous tissue.

The third portion (see Fig. 2) corresponded to the neighborhood of the lachrymal gland, which was also contained in the preparation. While the greater part of the lachrymal gland showed normal relations, numerous blood-vessels penetrated between the lobules of the gland at the place where the tumor began. One can clearly trace how the glandular spaces were pressed together and occlusion of the lumina and atrophy of the glandular epithelium were brought about. But bands of endothelial cells adhere closely to the penetrating vessels and penetrate with them into the substance of the lachrymal gland.

The investigation of the piece of recurrent tumor removed at the time of the Kroenlein operation showed relations which corresponded in the main with those described as of the second part of the tumor. The tumor consisted of numerous vessels and endothelial cells lying between them. Between the lobules of the tumor there was a connective-tissue stroma which in many places enclosed fat tissue and contained nutrient vessels.

The tumor differed in certain clinical points from a typical angioma cavernosum and differed still more anatomically. Though the chief part of the tumor was composed of thin-walled vessels there was in all parts a great proliferation of endothelial cells, and in many parts these cells formed the tumor almost exclusively, and they formed a direct covering to the vessels where the tumor came in contact with the lachrymal gland. The infiltrating processes mark the tumor positively as malignant.

The designation angiosarcoma is one which it is better to avoid. As Borst has properly remarked never has there been a word more misused or one which has caused more confusion than angiosarcoma. Ribbert also says that the relation of the cells to the vessels leads us to the designation angiosarcoma. The cells are in a particularly intimate

genetic relation to the vessels. But the name causes only perplexity and should be wholly abandoned, for either the tumors included under this name should be classed among neoplasms which are not truly sarcomata, such as endotheliomata and peritheliomata, or so far as they are sarcomata they share the relation to the vessels with this entire group of tumors and the intimate relation with the vessels becomes more prominent than usual only under certain conditions. Hence a better name will be endothelioma or hæmangio-endothelioma intravasculare.

In this as in most of the other cases only a hypothetical conclusion can be drawn as to the place of origin of the tumor. Probably it started in the neighborhood of the lachrymal gland, between it and the upper lid. The principal part of the tumor appertained to this region, including the portion of relatively benign character and most resembling the picture of the cavernous angioma, while those parts in which the tumor encroached upon the lachrymal gland and in which the abundance of cells was particularly marked were of later date.

In modern literature we find in addition to numerous typical cases of cavernoma of the orbit others which present peculiarities in their diffusely infiltrated growth, their cellular contents, and their clinical course. These tumors have been denominated in part angiosarcoma, in part as sarcoma teleangiectaticum, as transformed angioma, and as angiofibroma. De Bono pictures an adenoangioma of the orbit, Kumberg a rhabdomyoangioma cavernosum, Campart mentions islands of glandular tissue within the tumor. The course in these cases differed. Würdemann's case was very malignant and ended fatally from numerous metastases. In Trombetta's case, which showed a great resemblance to the one here described, the tumor extended from the frontal sinus to the brain and the other sinus. The other cases ran more favorable courses.

The question whether such tumors can be distinguished from the simple angioma of the orbit is of clinical importance. The two conditions usually share the most important symptoms, the site of the tumor is not characteristic, neither is rapid growth or recurrence after extirpation. The diagnosis

can be best determined by microscopical examination of the excised tumor.

It is noteworthy that in spite of the former recurrence, the diffuse character of the neoplasm, and the surely not radical extirpation at the second operation a second recurrence has not taken place at the end of a year and a half. In this it contrasts with other cellular infiltration tumors in the orbits of children, which usually recur within a few months after radical exenteration of the orbit and prove fatal.

Operative removal of such tumors should not be delayed; other methods of treatment present little hope of success. In the case of all tumors it is best to penetrate deeply into the orbit first by means of Kroenlein's operation.

INVESTIGATIONS CONCERNING THE EXTENT OF THE ACTIVE PUPILLO-MOTOR AREA OF THE RETINA AND CONCERNING THE PUPILLO-MOTOR RECEIVING ORGANS.

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(*With one illustration in the text.*)

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1. Among the unsolved problems of physiology the extent of the active pupillo-motor area of the retina is of particular interest. A pathological and clinical advance will become possible when we become acquainted with the pupillo-motor receiving apparatus and know whether these organs are to be found scattered throughout the retina, or confined to a comparatively small area. An observation by Heddæus suggested the latter possibility more than twenty years ago, but the condition there present was susceptible of more than one interpretation, and so important a question can be settled only by systematic studies of the normal eye. The opinion universally held in modern physiology, ophthalmology, and neurology seems to be that the entire retina contains more or less pupillo-motor apparatus, at least, that portions of the retina at a distance from the macula may call forth the light reflex of the pupil, and that the hypothesis of a reflex insensibility of the periphery of the retina is untenable. I have not found this problem solved in a faultless manner and have therefore attacked it with new methods. I think that a serious fault has been made hitherto in the neglect or undervaluation of the influence exerted by diffused light during irradiation of a certain part of the retina.

2. In the investigations hitherto made attention has been directed to the contraction of the pupil which takes place on the entrance of light into a previously unilluminated eye. But the central portion of the retina is then affected by a greater or less quantity of diffused light, and as we have no knowledge in regard to the pupillo-motor sensitiveness of this part of the retina and of its adaptive changes, we have no means by which to determine whether the resultant pupillary reaction proceeds wholly from the stimulation of the central portion by the diffused light, or from that of the peripheral portion by the refracted and the diffused light. An isolated irradiation of the central or of the excentric parts of the retina is impossible in the nature of things, and therefore the question as to the share of either in the production of the pupillary reaction cannot be solved in this way.

I have adopted a different method. I do away with the disturbing influence of the diffused light by making it as constant as possible at the fovea during the series of experiments. If a light is moved in an arc about the point of fixation as a centre, its image will always fall upon places in the retina equally distant from the fovea, and the strength of the diffused light in the centre of the retina will remain approximately the same. When this light is moved in an arc about the point of fixation no change takes place in the diameter of the pupil, even when it has been allowed to shine for some time upon one place in the retina and is then moved quickly to another equally distant from the centre. This may be explained in two ways: that the pupillary reaction is excited only by the central portion of the retina, the illumination of which has remained approximately constant, or that portions of the retina equally distant from the centre possess an equal pupillo-motor value. I have stimulated portions of the retina equally distant from the centre in two ways: 1, by carrying the irradiating light from the position of the blind spot to a place on the sensitive retina equally distant from the centre, and the reverse; 2, by carrying the light from a portion of the retina relatively adapted to dark to another at the same distance from the centre relatively adapted to light, or irradiated at the same time by another light, and the reverse. These two methods are to be considered separately.

3. If the image of a constant light is moved from a more peripheral to a more central portion of the retina, a distinct contraction of the pupil usually takes place, and the extent of movement necessary to produce such a contraction is generally very slight. The advocates of the theory that the entire retina is pupillo-motor assume that in this case the contraction occurs because the pupillo-motor receiving organs in the central portions of the retina are more sensitive than those in the peripheral parts. If this theory is correct, a pupillary contraction must take place when the light is moved from the blind spot to an equally excentric portion of the retina previously affected by diffused light alone. If, on the contrary, only a relatively small central area is pupillo-motor, and if the contraction of the pupil in excentric irradiation is to be ascribed to the foveal diffused light alone, the transference of the light from the blind spot to the retina will occasion no contraction of the pupil as long as the quantity of diffused light in the centre remains practically the same.

4. I have based upon the above considerations my investigations, which were made with the help of an apparatus that may be designated a pupil perimeter.

On a firm stand (*a*) was fastened a rod movable up and down (*b*), to which was attached a metal quadrant (*c*, *e*) revolvable about its axis (*c*, *d*). This quadrant had a radius of 35*cm*, and had attached to it at right angles a cylinder impervious to light (*f*) containing an electric lamp. The anterior surface of the cylinder was formed of ground glass in front of which was placed a diaphragm, by means of which the diameter of the irradiating surface could be varied at will from 0 to 22*mm*, and the light strength could be still further varied by means of a rheostat, or by the interposition of more ground-glass plates. At the zero point of the quadrant (*c*) a little electric lamp was placed in a capsule provided with a minute opening the light strength of which was to be regulated so that the observer could just perceive the opening as a minute, weakly lighted point in the condition of adaptation in which he was at the time.

By moving the lamp (*f*) on the quadrant (*c*, *e*), and by turning the quadrant about its axis (*c*, *d*), places on the retina

equally distant from the centre could be investigated in the above-mentioned manner, at such excentricity and with such size and strength of the irradiating light as might be desired.

The play of the pupils was observed entoptically in the other eye.

In order to exclude from this second eye the light with which the other was irradiated I used the following device. In a black automobile spectacle frame the glass for the left eye was replaced by a black metal plate with a very small opening in its centre. Behind this opening was fastened a little metal box impervious to light to hold the controlling electric lamp. The frame was adjusted so that no trace of light could enter

the eye when the current to this lamp was cut off, and the observer controlled the size of the diffusion circles seen entoptically. In many experiments two openings were made in the metal plate so that the observer saw two diffusion circles partly overlapping each other; at the proper distance a change in their diameters could be easily observed.

A short tube blackened within was substituted for the spectacle glass for the right eye. At its anterior end was a diaphragm by the proper adjustment of which the light that entered from the side was disposed of so that in fact only the fixation and irradiating lights with their immediate surroundings were visible. The table on which the instrument stood, as well as the background before which the observations were made, were covered with black cloth, and all disturbing reflexes were carefully removed. The observer, more or less adapted to the dark, sat with his chin supported in front of the instrument, which he placed so that the diffusion circle of the lamp for entoptic observation was seen in the same direction as the minute point of the fixation lamp for the eye to be irradiated. Part of the experiments were performed with relaxed, part with active accommodation. The assistant changed the position of the light, the observer devoted himself to noticing whether the entoptic picture of the left eye changed.

In the study of pathological cases the uniocular pupillometer of Krusius may be used to observe objectively the consensual pupillary action, but the entoptic method has the advantage that much less light is necessary than for objective observation and therefore smaller changes are perceptible. If the strength of the irradiating light is increased the pupillary movement of the irradiated eye itself might be observed by another person.

The movements of the perimeter quadrant carrying the source of light should not be too extensive, as the conditions for the penetration of the light through the sclera and iris are more favorable when the quadrant is in a horizontal than when it is in a vertical position. Its excursions should therefore be confined to from 10 to 20°.

5. The following experiment shows that the diascleral light must be taken into account.

After cocainization of my eye I fitted over it a thin glass shell with its centre covered by a disc of tinfoil that extended on all sides some millimetres beyond the margin of the cornea and permitted no light to enter the eye except through the sclera. Light and darkness could then be readily distinguished and the pupils contracted and dilated in response to the diascleral light diffused over the fundus. The fact that the diascleral light alone may suffice to excite contraction of the pupils as irradiation is commonly performed is of importance in the estimation of the value of our usual clinical methods.

6. Before we proceed to the principal experiment the phenomena should be studied which are perceived when the image of a luminous object is cast on the blind spot.

In the dark room one eye, with the other covered, was directed toward a minute, very weakly illuminated fixation point and a small bright surface was so placed that its image fell wholly upon the blind spot while its light strength was varied. If the observer was adapted to the light, or had been for only a short time adapted to the dark, and if a slight light strength was used at first, the minute fixation point was alone perceptible. If the light strength was then gradually increased, or if, with this remaining constant, the sensitiveness of the eye to light increased from adaptation to dark, with the line of fixation unchanged, a luminous appearance was soon perceived about the blind spot, shading off uniformly in all directions and extending farther over the neighboring portion of the fundus as the light strength, or the sensitiveness of the eye of the observer to light increased, while the source of the light naturally remained quite invisible. A very slight light strength usually sufficed for the perception of this luminous appearance. When the eye was kept perfectly quiet the apparent brightness of this luminosity gradually diminished under the influence of the local adaptation until after some time it disappeared entirely. If the eye then looked directly at the source of light the latter appeared to be moderately bright, but its immediate surroundings seemed less so, because of contrast, than the luminous appearance when the light was thrown on the blind spot. If then the eye was turned again so that the light fell on the blind spot the luminous appearance reappeared comparatively bright. By

entoptic observation of the consensual pupillary reaction it was easily demonstrated that this projection of the light upon the blind spot resulted in a distinct contraction of the pupil, evidently due wholly to the diffused light.

This experiment shows impressively with what weak light strength of an irradiation the diffused light in an eye alone may occasion a strong pupillary reaction. Whoever makes such observations with his own eye will no longer believe that an exclusive stimulation of the centre of the fovea is theoretically possible. In this experiment the light that enters through the iris or sclera and becomes diffused cannot play a part that demands consideration, because the result is the same when light is permitted to enter only through the pupil by means of a diaphragm held close to the eye.

In all of these experiments care was taken that only a comparatively small portion of the head of the nerve was irradiated. With the source of light at a distance of $1m$ and of a diameter of $1cm$ the retinal image has a diameter of only $0.15mm$, or $\frac{1}{12}$ of the normal diameter of the papilla and thus covers only about $\frac{1}{144}$ of its surface. Yet under such conditions the circumpapillar brightness of the diffused light was to be clearly seen. In one series of experiments a luminous disc $3mm$ in diameter was placed $33cm$ in front of the eye. According to the usual calculation the size of the retinal image in this case was $0.136mm$ when the eye was fixed on the object. When the eye was adjusted for parallel rays diffusion circles $0.18mm$ in diameter appeared on the retina. Thus the image of a disc $3mm$ in diameter covered a surface the outermost margins of which were, according to the usual calculation, $0.31mm$ apart and even with this indistinct delineation covered a surface on the blind spot only $\frac{1}{36}$ the size of the area of the surface of the nerve head.

If the stimulating light was given such a size that its image on the papilla covered only $\frac{1}{20}$ or $\frac{1}{100}$ of the surface and then the light strength was increased a little, its position and size remaining unchanged, a distinct contraction of the pupil regularly took place which must be ascribed exclusively to the increase of the diffused light, because the image lay wholly on a blind spot. This shows what slight changes of the diffused light may suffice to excite pupillary action under

conditions in which a pupillo-motor action of the image of the stimulating light is perfectly excluded.

It cannot be said that an equal diffusion of light takes place when the image of the source of light falls on the retina outside the blind spot, for it may be that more light is diffused from the clear portions of the papilla and lamina cribrosa than, with equal irradiation, from any part of the retina where a rather large part of the light passes through the retina and is absorbed by the pigment. But even when the light falls on the sensitive retina there must be some diffusion. We have no means with which to measure this diffusion, but it may become visible, although the physiological conditions are much more unfavorable for its perception than when the image is thrown on the papilla, because of contrast.

7. The following experiment was now made with the aid of the pupil perimeter. After the right eye had been properly directed toward the minute fixation point 35*cm* away, the quadrant was placed in the horizontal meridian outward from the eye and the apparatus for irradiation so placed, and the diaphragm so arranged, that the source of light was invisible The assistant then quickly moved the quadrant up or down so that the source of light was plainly visible and, after the lapse of several seconds, returned it to its former position. Then, while the quadrant remained in place, the light was moved either toward the centre or toward the periphery until it became visible, and was again returned to its primary position. While this was being done the size of the pupil was observed entoptically in the manner already described. I have repeatedly performed this experiment myself, several of my colleagues have done likewise, and the results obtained were uniform.

8. If the image of the light source was moved upward, downward, or outward from the blind spot, there was no perceptible change in the pupil, but if it was moved inward toward the fovea, a distinct contraction of the pupil was produced. When the light fell at first on the retina above or below the blind spot and was moved so as to fall on the latter there was as a rule no characteristic change of the pupil, but sometimes a transient contraction was perceptible. When light that fell on the retina external to the papilla was moved

so as to fall upon the latter a distinct contraction of the pupil frequently took place; when it was moved from a place on the retina internal to the papilla to the latter no distinct change or a very transient dilatation was perceived.

9. These facts are incompatible with the theory that the portions of the retina adjoining the blind spot above, below, and to the outer side are possessed of any noteworthy pupillo-motor value, for these portions which at first were affected only by the comparatively very weak light diffused from that which fell on the papilla were affected by a very much greater quantity of light when the source of light was moved, and therefore a distinct contraction of the pupil must have taken place if they had contained pupillo-motor receiving organs.

The following experiment aids in the understanding of these conditions. A place in the retina near the papilla, above or below it, was irradiated in such a way that the light from a luminous surface close to or behind the observer was reflected into the eye by a glass plate properly placed in front of it. The irradiating light used in the preceding experiment was made visible behind this glass plate so that the little, only slightly more luminous disc could be seen through the light reflected from the plate. If this light was alternately covered and uncovered a distinct pupillary movement took place each time. The advocates of the popular theory would ascribe this pupillary movement to the pupillo-motor excitability of the retina about the papilla, but the previous experiment has shown that no pupillary reaction takes place even with a much greater change of the strength of irradiation so long as the diffused light about the fovea remains constant.

If a luminosity of greater or less light strength was cast on a place in the retina above or below the papilla and the size of the field was enlarged in such a way that the foveal margin of the image remained unchanged while the peripheral margins were extended, a contraction of the pupil was occasioned by a slight increase in the size of the field. This can be explained only by the increase of diffused light about the fovea.

10. The above results were confirmed by the following experiment. Lights of different sizes and strengths were thrown

alternately on the blind spot and on neighboring portions of the sensitive retina equally distant from the fovea. The pupillary reaction when the light was cast on the blind spot did not differ from that produced when the light fell on these neighboring portions of the retina. When the light cast on the blind spot was so weak that it caused a just perceptible contraction of the pupil the reaction when the light was moved to the retina was not noticeably greater. When the weakest light was used that, cast on the retina above or below the papilla, would cause a perceptible reaction of the pupil, and was thrown on the blind spot, a reaction followed without exception and sometimes it was even more marked.

11. All of our observations thus far go to show that within the limits of the light strength used only a small central area of the retina gives rise to the pupillary reflex. The contraction of the pupil which takes place when the light is moved from the blind spot towards the fovea may be explained either by the increase of the diffused light in the central area of the retina, or by the assumption that the portion of the retina between the fovea and the blind spot is pupillo-motor. The preceding experiments have shown that the portions of the retina in the region of the papilla 3*mm* or more distant from the fovea are not pupillo-motor. If pupillo-motor areas exist outside of the centre of the retina they probably lie more or less concentrically about the point of direct vision, and we may conclude that the pupillo-motor area of the retina has at most a radius of 3*mm* and may be much smaller.

12. The second method I employed in attacking these questions is based on the following consideration.

A smaller quantity of light suffices to excite a pupillary reflex in an eye adapted to the dark than in one adapted to the light, so there is in the human eye an adaptation to the dark not only for light preception, but also for the pupillary reflex.

If in an eye, the general irradiation of which remains the same, a light is cast alternately upon portions of the retina adapted to light and to dark, or upon those irradiated with different light strengths, while the quantity of foveal diffused light remains constant, it is to be expected that with the transition of the image from a portion of the retina relatively

adapted to the light to one relatively adapted to the dark, or from a part more strongly to one more weakly irradiated, a pupillary contraction will take place if the peripheral parts of the retina are pupillo-motor and partake in the adaptive increase of sensitiveness for the pupillary reflex. But if with such a transition of the light no change should take place in the diameter of the pupil it would be evidence of the incorrectness of the theory that these peripheral portions of the retina participate in the excitement of the pupillary reflex.

13. At the proper distance in front of the eye of the investigator a glass plate was so placed that it reflected into the eye the image of an illuminated square disc of ground glass situated to the side of or behind the observer, and behind this glass plate was placed a small, round source of light, variable in size and intensity, the one used in the preceding experiments. The observer then saw upon a dark background a more or less brilliantly illuminated square surface and within this a brighter spot. If he then fixed on a point in the lower margin of the bright square, the upper half of the field of vision was illuminated and separated by a distinct line from the lower which was dark except for the diffused light. If the light then was moved down behind the glass plate it appeared very much brighter after it had passed to the dark portion than it did when it fell on the bright upper half, but the total quantity of light that entered the eye remained unchanged, and if the source of light was revolved about the fixation point as a centre the quantity of the foveal diffused light also remained unchanged. The regular result was that the transition of the light from the illuminated to the dark portion of the retina, or the reverse, produced no change in the diameter of the pupil.

This series of experiments was completed by alternately covering and uncovering the movable light, in various strengths, sometimes when it was cast on the illuminated, sometimes when it fell on the dark portion of the retina. The smallest degree of light strength which could excite a pupillary contraction when thus cast on the illuminated part of the retina was ascertained, and when this was cast on the dark portion no greater contraction took place. When this procedure was reversed the same result was obtained.

14. With the eye of the observer fixed for one or two minutes on a point in the margin of the illuminated square the small round light was passed from the relatively bright to the relatively dark portions of the retina at the same distance from the fovea, but with the distances varied. The smallest distance at which positive observations proved possible was about 2*mm* from the fovea and at this distance the transition of the light caused no change in the pupils.

Repetition of the experiment with sudden covering of the light, which caused a marked pupillary movement, gave the same results in the parts of the retina adapted to light and to dark.

15. The experiments described above show that within the limits of the light strength employed only a comparatively very small central area of the retina can be pupillomotor and that the remaining peripheral retina is not. The diameter of this area cannot be more than 4*mm* and may be much less.

This result was a surprise to me, for I had undertaken these observations with the idea that the peripheral retina partook in the production of the pupillary reaction and had already perfected an apparatus based on this theory.

The advocates of the theory that the entire retina is pupillomotor assume that the reflex sensibility decreases from the centre towards the periphery and so explain the fact that a stronger light thrown on the periphery excites a similar or equal contraction of the pupil as a weaker light thrown on the centre. But the same result will be produced if the centre alone is pupillo-motor from the diffused light in the one case and from the direct light in the other.

Under the ordinary conditions of vision the different parts of the retina differ in the strength of their irradiation, and with each motion of the eye the strength of irradiation of each individual place is increased or diminished; hence, should the entire retina be pupillo-motor numerous pupillary impulses would be constantly excited which in great part would neutralize each other, and finally there would remain only a sort of average to determine the size of the pupil, while because of the preponderating influence of the greater reflex sensibility of the fovea the result would be the same as though only a

central area was pupillo-motor. Although such considerations have little value it may be well to emphasize the statement that as yet not a single fact is known which furnishes satisfactory evidence in favor of the theory that all portions of the retina are pupillo-motor.

16. These conditions enable us to consider various clinically important questions from new points of view. The hemianopic pupillary reaction may be alluded to in a few words. The usual method of investigation of this reaction is to stimulate the previously dark retina with rays of light that enter the eye in certain directions and to try to determine whether the pupillary contraction induced by irradiation of one side is greater or less than that induced by irradiation of the other, or whether it may perhaps be absent. It is unnecessary to enumerate all the sources of error present in such a method if we bear in mind the important part played by the diffused light, and that the diascleral light may have an influence on the result. The investigations hitherto made can give us no information as to whether there is a hemianopic pupillary reaction or not.

The methods here described indicate the way in which some of the problems involved may be solved. If with a moderate excentricity the source of light on the quadrant of the pupil perimeter is placed directly below, while the patient to be examined fixes on the middle point of the quadrant, and the latter is moved 10 to 20 degrees alternately to the right and to the left a change in the size of the pupil must follow each movement to one or the other side of the vertical if a hemianopic reaction in the usual sense is really present, for the image of the stimulating light having a constant light strength will fall alternately on the blind and on the normal portion of the retina, and the diffused light will not be a disturbing factor. The investigation of a sufficient number of cases, particularly of such as those in whom the presence of a hemianopic reaction is believed to have been demonstrated by previous methods, will soon enable us to answer definitely this neurologically important question.

The investigation of eyes with degenerative processes in the retina or optic nerve may be able to broaden in various directions and to complete the observations made by us in

normal eyes. Suitable cases of paramacular degeneration may perhaps serve to render possible a more exact determination of the extent of the pupillo-motor area of the retina.

17. To ascertain the anatomical foundation for these interesting physiological phenomena it must first be determined in what elements of the retina the pupillo-motor receiving organs are to be sought.

I have shown by observations on the color sense of day birds that the seat of the primary stimulation for the perception of light and color is in the outer portions of the cones. In these animals the limits of the visible spectrum are about the same as those for our eyes at the long waved end, but markedly abbreviated at the short waved end. This abbreviation corresponds to the absorption of the short waves of light by the red and yellow oil globules present in the retinæ of these birds between the inner and the outer portions of the cones. With the same apparatus I now systematically ascertained the pupillo-motor valences of the rays of different wave-lengths in varying conditions of adaptation in order to obtain a delineation of the curve of these valences. If the pupillo motor receiving organs are situated to the outer, scleral side of the colored oil globules it is to be expected that the long waved rays of the spectrum will show relatively great pupillo-motor valence, at any rate a proportionately greater one than in retinæ without such oil globules as those in the night birds, other things being equal. But if the pupillo-motor receiving apparatus lies internal to the colored oil-globules such a result is improbable.

Very distinct results can be obtained by the use of a sufficiently broad spectrum and by testing the pupillary reaction each time by alternately interposing and removing a black screen. By changes of the width of the aperture and of the distance, the light strength of the separate colors and the breadth of the entire spectrum can be varied within such limits as may be desired.

In other experiments I placed at a proper distance in front of the prism projecting the spectrum a large black screen in which a narrow aperture was so placed that the homogeneous light passing through it served to irradiate the eye of the bird placed behind it. The screen was movable in a slide

perpendicular to the direction of the light rays so that lights of different wave-lengths could be easily used one after another to irradiate the eye. The aperture could be quickly opened and shut by means of a lever.

I placed the eye of the animal at the centre of the pupil perimeter and observed the reaction with varying positions of the light. In the dove the reaction was greatest when the light came from in front, or from in front and downwards. It was much less, ceteris paribus, when the irradiation came from behind. In the horned owl irradiation from in front produced a greater contraction than, ceteris paribus, one from the side. The difference was most marked in screech owls in which irradiation from in front produced a marked contraction while that from the side produced scarcely any. At another time I intend to discuss these results, but shall confine myself here to those which have most bearing on the questions under consideration.

18. (*a*) The pupil of the dove adapted to the dark generally showed a distinct though weak reaction to irradiation with the outermost visible red of the spectrum. The reaction grew stronger toward the orange and was greatest in the orange and yellow; in yellowish green and green it was still very distinct, but less strong. Toward blue and violet the extent of the pupillary contraction rapidly decreased, and if the adaptation to dark was not very far advanced, the reaction might be absent in blue. The same results were obtained with hens and with two white daws with bright gray pupils.

(*b*) The pupils of the horned owl adapted to the dark reacted weakly in the outermost red. The reaction increased slowly toward yellowish red, then more rapidly toward orange and yellow. In yellowish green and green it was distinctly greater than in yellowish red and always distinct, in blue and violet it was still distinct though less marked.

The curve of the pupillo-motor valences of the homogeneous lights for the eye of the horned owl adapted to the dark thus has its maximum in the region of the yellow green to green and falls away rather abruptly towards the long waved end, more slowly toward the short waved end. It thus corresponds in size and extent to the curve of the white val-

ences as determined by Hering for the human eye adapted to the dark, and to Sachs's curve of the pupillo-motor valences for the eye of the totally color blind at each light strength, and for the normal human eye adapted to the dark with sufficiently little strength of the exciting light.

The curve of the pupillo-motor valences of the eyes of the day birds was of a different type, as its maximum was in the red yellow to yellow, and it fell off rather abruptly toward the short waved end. These observations agree with those made by Abelsdorff.

(*c*) By interposition of a suitable yellowish red glass before the eye of a night bird the type of the pupillo-motor valence curve of such an eye may be made similar to that of the eye of a day bird in so far as the maximum is moved to the red yellow and the curve sinks abruptly at the short waved end.

(*d*) Day birds and horned owls that had been for some time in a bright room or in the open air showed at first no pupillary reaction when tested with the spectrum; when first placed in the dark the pupils remained dilated and rigid in all lights of the spectrum. In doves a distinct reaction could be obtained after they had remained in the dark for five minutes, but in horned owls the pupils were still rigid at the end of half an hour and reacted very actively at the end of an hour.

If one eye of a horned owl is adapted to light and the other to the dark the first does not react to irradiation with homogeneous lights, while the other does react very actively. Clear daylight calls forth a distinct contraction in the eye adapted to the light.

In a former article I have shown that day birds have a considerable degree of adaptation to the dark. In this article I have shown that they likewise possess a marked pupillo-motor adaptation to the dark.

All of these facts taken together demonstrate that in the day birds not only the optic but also the pupillo-motor receiving apparatus is situated in the outer portions of the cones.

ILLUSTRATING DR. VAN DER HOEVE'S ARTICLE ON "COLOBOMA AT THE NERVE-HEAD WITH NORMAL VISION."

Coloboma at the nerve-head with normal vision.

COLOBOMA AT THE NERVE-HEAD WITH NORMAL VISION.

By Dr. J. VAN DER HOEVE, Leyden.

Translated from Vol. LVII., No. 1, German Edition of these Archives, by Dr. Percy Fridenberg, New York.

(*With two Text-figures and Text-plate* VII.)

AMONG a number of young recruits recently examined for military service, the following case appears of sufficient interest to be reported:

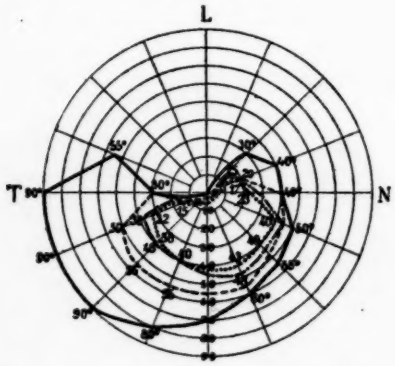
M. R., aged 19 years, has always squinted with the left eye, which has, however, caused no discomfort. The right eye has always been normal. Examination of the left eye showed marked divergent strabismus, and a coloboma of the iris, downwards. Good central fixation. V. O. S. $= \frac{5}{60}$. No correction with glasses. Corneal astigmatism of 2.5 D., axis vertical. Ophthalmoscopic examination revealed a coloboma of the lens, of the choroid, and of the optic nerve. The coloboma of the lens appeared as a saddle-shaped nicking of the lower lens margin, with a few small opacities in the immediate vicinity. In the area of the coloboma of the iris there were no ciliary processes nor zonula fibres to be seen but there was an irregular mass of iris pigment projecting into the coloboma from the temporal side of the root of the iris.

The presence of a coloboma of the ciliary body was suggested by this condition, but was not demonstrable. A few threadlike opacities, both stationary and floating, were noted in the vitreous. The coloboma of the choroid was so extensive as to include the disc. The retinal vessels made their appearance at very irregular intervals. Within the coloboma there were a number of deep excavations. Examination of the visual field showed, as was to be expected, a large defect for white and colored objects

corresponding to the choroidal coloboma (Fig. 1), which included the normal blind spot of Mariotte.

The right eye showed no abnormality externally. There was astigmatism of +0.25 D., axis vertical, with V. O. D.

Fig. 1.

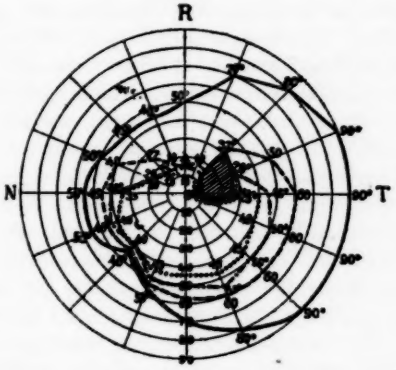


$=\frac{1}{1}$, so that I expected to find a perfectly normal fundus. Much to my surprise, ophthalmoscopic examination revealed a very striking anomaly. At the point where the disk would naturally be found, there was a bright white patch, partially surrounded by a border of pigment, which again was framed by an incomplete ring of atrophic choroid. This patch was about nine times the size of the normal disc. The retina was emmetropic; the white patch lying about 2 D. deeper, and showing three deep excavations, one above to the nasal side, one above to the temporal side, and one below to the nasal side, with a myopia of 7 D. The central vessels made their appearance quite regularly, either from the edge of the patch or from the deeper excavations. Within the coloboma, vessels could be indistinctly seen (out of focus) which showed marked parallactic displacement in regard to the plane of the retinal vessels. The macular region could not be clearly seen. A vorticose vein was noted above the coloboma. The visual field of this eye had normal dimensions for white, with a large defect to the temporal side of the point of fixation, corresponding to the coloboma.

The condition was evidently that of a coloboma at the nerve-head without any other developmental anomaly in the ocular structures. In the iris, particularly, there was

no trace of a coloboma, such as is often indicated by a thinning of this membrane below, resulting in a change in color. No changes could be detected in the retina or choroid. Further careful functional test of the visual field, however, showed that in this eye, too, the perceptive elements were not fully developed in the lower portion of the fundus, for although the field for white was complete, there was a defect for colors in the upper part (Fig. 2). Central color percep-

Fig. 2.



tion was acute. Both eyes presented an unusually small cornea. The horizontal diameter was 10*mm* in both eyes, the vertical diameter, 9*mm* in the right, and 10*mm* in the left eye; the normal figures being, respectively, 11.5*mm* and 11*mm*.

The corneal radius of curvature was about normal, about 7.8 to 8.3*mm*. Tension was about normal. The excellent function of the right eye, in spite of the large coloboma, could be inferred from the fact that the patient, a type-setter and lithographer, was never incommoded by any visual defect in his work, and is rather expert as a marksman. It is evident that the optic nerve fibres, however widely they have been forced apart, have not been affected functionally.

It appears that the occurrence of coloboma is no great rarity in the family of this young man. His mother had a double coloboma of the iris, and one sister had the condition, limited, as in his case, to the left eye, which was very small and squinted inward. The other eye was normal. There

were no other externally visible anomalies in the case of the father, the brother, and of three other sisters, or in the family of the mother, who ascribed her condition to a maternal impression caused by fright.

It would have been interesting to ascertain whether in any of the other members of the family there were fundus changes or defects in the lower field of vision for color.

Cases like the one described above may be of medico-legal interest and cause some difficulty in determining damages or amount of wage-earning capacity after injury. If this patient were accidentally to be deprived of three fourths of the sight of his right eye, an examining surgeon might hesitate to believe that there had been actual reduction of sight, taking it for granted that in an eye so imperfectly developed, there had probably never been more than $V = \frac{1}{4}$. Under these circumstances the man would be unjustly suspected of aggravation, and they would be doubly unpleasant as, having had but one good eye, the accident would have decidedly impaired his earning capacity.

The combination of normal vision with so extensive a coloboma of the nerve-head is one of the greatest rarities. De Wecker reports such a case in a young girl. The coloboma had an extent of about 2 P.D. Defects in the upper quadrants of the field were found by Nieden in two cases of coloboma of the sheath of the optic nerve, but there is no record of their color fields. His third case was very like mine, presenting a coloboma of the uvea and of the nerve in the left, and of the nerve alone in the right eye. The disk appeared three times the normal size; vision was reduced to $\frac{1}{7}$ or $\frac{1}{8}$, and the fields were normal.

Circumscribed excavations within the limits of the nerve-head have been described as congenital anomalies, but v. Hippel thinks it is at least doubtful if they bear any relation to the coloboma. In the case reported by van Duyse there were three such depressions in a total excavation of the papilla, and the illustration plainly shows how the vessels ascend from these excavations as well as from the margin of the coloboma. Many theories have been advanced to explain the mode of development of congenital coloboma.

In regard to coloboma of the lens, Hess considers three hypotheses:

1. Persistence of vessels supplying the fœtal lens capsule;
2. The presence of strands in the vitreous; and
3. Partial or complete absence of the zonula.

The second of these theories appears to apply best to my case, as there were still strands to be seen in the vitreous, with small opacities in the lens near the coloboma, which, as Hess says, can hardly be explained by mere absence of the zonule, and because the other colobomata could logically be ascribed to the same basic cause as the vitreous strands. These strands may be the result of an atypical development of the mesoderm which connects the cavity of the optic vesicle with the surrounding cephalic plates, and may contain vessels which supply the vascular capsule of the lens. They may interfere mechanically with the development of the lens and iris at some particular point, as was probably the case in the microphthalmic eye with coloboma lentis, described by Hess, as well as in his case of iris-coloboma, where the strand could still be seen in the full-grown eye.

Coloboma of the choroid may be due to a primary disturbance in the tissues of the cephalic plates which surround the optic vesicle. If this disturbance takes place at a time when the fœtal cleft is still open, it may lead to persistence of the mesodermal tissue and to incomplete closure of the cleft, causing a complication of choroidal with retinal coloboma. If the cleft has already closed there may be retinal tissue in the coloboma.

Caspar has divided coloboma of the nerve into three groups, according to the course of the central vessels:

1. The vessels appear quite irregularly near the lower margin of the disk.
2. They appear at the middle or nearer the upper margin.
3. They are separated within the coloboma but arranged fairly regularly about the centre.

My case belongs to the third group. Caspar draws conclusions as to the anatomical structure of the coloboma of the nerve from the peculiarities of course of the central vessels, but v. Hippel has shown that clinical studies give us no clue whatever as to the topography of the nerve and its

sheaths. Anatomical investigation showed that in many cases of so-called coloboma of the nerve-head there was merely an ectatic coloboma of the choroid or an incipient orbital cyst, and that there need be no actual defect of the nerve or its sheath.

Caspar explains all three groups by more or less marked anomalies in the closure of the fœtal furrow in the optic nerve. In the third group the edges of this furrow meet only at its lower margin so that the nerve has the form of a tube which expands as it runs forward to form a hollow cylinder, along the walls of which the central vessels, whose combined calibre is too small to fill the bore, run after dividing into smaller branches. The failure of the furrow to close may be due to excessive development of the mesodermal tissue enclosed in the nerve or a defective formation of its anterior, endoptic termination due to insufficient pressure of the cephalic plates which enclose it and normally bring about complete closure.

Whether these anomalies are to be reckoned as ectatic choroidal coloboma or as coloboma of the nerve sheath, they are caused, as are the developmental defects of iris, choroid, and ciliary body, by atypical formation of mesodermal tissue in consequence of disturbances in the tissues of the cephalic plates surrounding the optic vesicle. The nature of these disturbances is not known, as yet, but v. Hippel has shown beyond a doubt by his experiments on rabbits that they may be hereditary, and this view is supported by the fact that, in the case above reported, a woman with double coloboma of the iris had two children, out of six, who showed the same defect.

POST-OPERATIVE DETACHMENT OF THE CHOROID FOLLOWING IRIDECTOMY FOR GLAUCOMA.[1]

By Dr. FERDINAND FISCHER.

Translated from Vol. LVII., No. 1, German Edition, of these ARCHIVES, by Dr. PERCY FRIDENBERG, New York.

BUT few cases of uveal separation following operations on the globe had been reported until Fuchs lately reviewed no less than 39, most of them coming on soon after operation for the extraction of cataract, but a few being seen after iridectomy for glaucoma. Of this variety 15 cases in all have been reported by Fuchs, Augstein, Axenfeld, and Demaria, while only three, those described by the first and the last of these authors, were examined pathologically. To these the following case is appended as it seems to add to our knowledge of the genesis and of the histological changes of the interesting condition noted in the title:

The patient, a woman of 65 years, had been operated on in 1900 for glaucoma in the left eye, and had been discharged as cured. At that time there was absolute glaucoma, O.D. An attack of acute glaucoma in this blind right eye brought the patient again to the clinic on April 17, 1903. Next day a posterior sclerotomy was performed to deepen the anterior chamber, with some loss of vitreous. A few days later, tension having been reduced, iridectomy was done. After three weeks the patient was discharged with minus tension, but returned in about a month on account of frequently recurring attacks of pain.

Examination O.D. showed slight œdema of the lids, with marked conjunctival and ciliary injection. The middle portion of the iridectomy wound could be seen above,

[1] From the Wuerzburg University Eye Clinic.

1*mm* back of the limbus, but the rest of the scar was hidden by the pretty marked general chemosis. The cornea was clear, and the anterior chamber exceedingly shallow, in fact, almost abolished. The iris presented a coloboma upwards about 3*mm* wide, the margins of which were adherent to the anterior surface of the lens. The iris tissue itself was gray and atrophic with some irregularly scattered islets of pigment on its anterior surface. The pupil had an irregular outline, and was completely covered by a delicate gray layer of exudation. The lens was diffusely cloudy, showing no clearly outlined opacities. The globe was exceedingly tender, and tension somewhat reduced. Amaurosis.

Enucleation of right eye.

The globe was divided by a vertical section into a nasal and a temporal half, both of which presented a slight knuckle-shaped detachment of the retina, under which the brown choroid could be seen shining through. This detachment extended on either side up to the root of the iris in front, and backward to within 5*mm* of the posterior pole. The length of the detachment, measured in the chord of the arc formed by the sclera, was 16*mm*. There was no detachment to be seen macroscopically either above or below. A horizontal section through the temporal hemisphere showed that the detachment involved both choroid and retina, an extensive hemorrhage occupying the retro-choroidal space.

Microscopic examination. The bulbar conjunctiva shows diffuse and focal infiltration with round cells, particularly marked in the vicinity of the iridectomy wound. A number of highly refracting spheroidal bodies, generally in the neighborhood of vessels, appear in the conjunctiva and protrude under the cornea at various points of the limbus. A positive reaction to iodin and to methyl violet proves these structures to be composed of tissue which has undergone amyloid degeneration.

In the peripheral portions of the cornea there is a uniform infiltration or interposition of a thin layer of connective tissue directly underneath the epithelium and above Bowman's membrane which is intact, here and there presenting detached epithelial cell-inclusions; the degenerative pannus of Baas. In the deeper layers of the periphery of the cornea a few vessels with slightly infiltrated perivascular spaces appear.

The sclera shows focal infiltration with round cells in the sheaths of the anterior perforating vessels and extending backward in the episcleral tissue. The iridectomy wound is closed by recent scar-tissue. Above and to the

temporal side, at the posterior flat boundary of the ciliary body the sclerotomy wound is found, leading into the large retro-choroidal hemorrhage. The section itself appears as a canal filled with blood whose walls have already begun to be separated from the contiguous granulation tissue of the sclera by a thin endothelial investment. Hæmatogenous pigment, giving a reaction with Prussian blue, is found from this point on in fairly large amounts between the scleral lamellæ and in the episcleral tissue.

The anterior chamber is exceedingly shallow; the iris angle everywhere blocked by peripherally adherent iris.

The iris is thickened, with diffuse round-cell infiltration and some foci in the neighborhood of veins. Here and there in the parenchyma areas of hyaline degeneration are found. The pigment-epithelium layer shows desquamation and breaking down at various points, and the pigment of the stroma has accumulated at intervals near the anterior surface in amorphous deposits. A thin layer of exudation covers the posterior surface of the iris and is continued over the pupil as a fine membrane with a few pigmented cellular elements. Within the area of the coloboma there are adhesions of the iris to the lens capsule.

The anterior layers of the cortex of the lens are filled with large faintly stained nuclei lying in vacuolized protoplasm, and with shrivelled, deeply stained, disintegrated nuclear remnants. The fibres of the posterior cortical layers have been loosened and shredded out by Morgagnian bodies and amorphous coagula.

The ciliary body is detached from the sclera throughout its entire circumference, most markedly on the nasal and temporal sides, preserving its anterior attachment to the sclera, only. In the vicinity of the iridectomy wound there is some cell infiltration. No tears could be found extending from the ciliary body to the anterior chamber.

The inner tunics of the eye protrude into the vitreous chamber in the form of a detachment which is deep and anterior in the nasal and temporal halves, but shallow and anterior as well as posterior in the upper and lower halves of the globe. The latter detachments had escaped detection on macroscopic examination on account of their slight elevation. About at the exit of the vorticose veins, above and below, both choroid and retina are in normal relation to the sclera for a short distance, so that a vertical section in the mid-line shows four flat detachments.

The nasal and temporal vorticose vein has been torn off after its exit from the sclera. The choroidal detachment ends posteriorly about 5*mm* from the posterior pole,

while the detachment of the retina extends on all sides beyond these limits almost to the disk.

The temporal detachment of the choroid has been caused by a copious effusion of blood which forces the fibres of the ciliary body apart and fills the large supra-choroidal space. Blood is also found, in less amount, underneath the flat detachments in the upper and lower halves of the globe, where it has already begun to separate into a coagulum with supernatant serum. The entire large cavity on the nasal side was also filled with serum which appeared macroscopically as a clear homogeneous soft-fluid mass which unfortunately fell out during preparation so that it could not be studied microscopically. Its character as blood serum and not, say, inflammatory exudate, is proven by the connective-tissue wall of the cavity and the marked hæmatogenous pigmentation of neighboring tissues.

The choroid spreads over the two large detachments; its lamellæ spreading until the membrane is 1.3*mm* thick posteriorly. The vascular layers are distended, the veins occasionally, to all appearances, varicose; the pigment cells stretched out and separated. The blood clot or cavity is surrounded by a thin layer of dense young connective tissue, staining red with Van Gieson, and showing an endothelial lining. The dense fibres of this layer running longitudinally are separated from the sclera and choroid by a delicate intercalated layer of supra-choroidal lamellæ. In the anterior and posterior angles of the detachment, this tissue is reflected from the choroid onto the sclera as a sort of loose broad membrane.

Inflammatory choroidal changes were found only in the nasal detachment. In the flat detachments of the choroid above and below, the meshes of the tissue were forced apart by homogeneous fluid, but there was no actual formation of a cavity. The retina is detached from the choroid only in the neighborhood of the nasal areas of choroidal inflammation, and shows marked thickening with œdema and degeneration of the rods and cones, and atrophy of the nerve fibre layer. Near the disk where there is a flat detachment of the retina alone, the membrana limitans externa has been torn and cells from the posterior nuclear layer have escaped through it (prolapsed granules). The nerve head shows a deep glaucomatous excavation, and complete atrophy of the disk.

This case accordingly shows a copious retro-choroidal hemorrhage following sclerotomy and iridectomy. It is hardly to be assumed, and there would be no warrant in

literature, that the sclerotomy section itself was the direct cause of the effusion. This is rather to be explained by the lowering of intraocular tension caused by the operation.

It is impossible to determine which of the two operative procedures brought about a rupture of blood-vessels in consequence of this sinking in intraocular pressure, although the probabilities are in favor of the sclerotomy being responsible, as tension had already been reduced by it at the time the iridectomy was performed.

Fuchs describes two cases of this sort following iridectomy for glaucoma, and speaks of them as expulsive hemorrhages which stopped half-way. The possibilities of ominous advance in sudden and marked lowering of tension are shown by the following case which I publish by kind permission of Dr. Merz (Rosenheim):

> Mrs. B., aged 70 years, suffered for a year with absolute glaucoma, O.S. After an injury, hypopyon keratitis developed in the glaucomatous eye and had grown rapidly worse by the time she came under treatment. Several days after cauterization of the ulcer it perforated spontaneously, below, during the night, and as there was protrusion of vitreous and intraocular tissues through the large perforation, the eye had to be enucleated. Section of the globe showed an enormous retro-choroidal hemorrhage which had completely detached choroid and retina throughout their entire extent from the disk to the anterior attachment at the ora serrata. The retina and choroid themselves had been forced out through the corneal rupture, the margins of which were infiltrated with pus. The lens could not be found, and the vitreous had almost entirely disappeared.

In this case the sudden lowering of intraocular tension was due to the large central perforation in the cornea and had given occasion to a most extensive intraocular hemorrhage (retro-choroidal) of the type which may follow glaucoma-iridectomy, but then, on account of the less abrupt lowering of tension, generally stops half-way.

Cases of this sort are quite unusual. Hosch made a probable diagnosis of perforating corneal ulcer as a cause of expulsive hemorrhage in a case which was studied clinically only, and Mellinger reports one in which he was able to make

a pathological examination. The possibility of expulsive hemorrhage in exceptional cases of glaucoma after iridectomy is further corroborated by the reports of Bloom and Burmester.

In my first case the source of the hemorrhage was to be sought in the vorticose veins which, it will be remembered, were found torn. Fuchs found a similar condition in both his cases. No tear was found such as Demaria describes as having been produced at operation in his specimens, establishing a communication between Schlemm's canal and the suprachoroidal space, and giving exit to the masses of blood. The post-operative hemorrhages which are typical of glaucoma-iridectomy appear to depend on rupture of retro-choroidal vessels, but mechanical tears may be a source of hemorrhage in exceptional cases.

Extension of post-operative hemorrhage is of course favored by loss of vitreous during the operation. This accidental complication was noted in every case thus far reported, and evidently made room for a spread of effusion of blood. In the cases of Fuchs and Demaria there were no inflammatory changes such as I could trace backwards from the wound along the vessel sheaths of the choroid and ciliary body, and finally collecting as a sub-retinal exudate leading to detachment. These changes were evidently secondary and could not be brought into any etiological relation with the choroidal detachment, in accord with Fuchs's views of the pathogenesis and mechanics of choroidal detachment.

The histological details of the thickened choroid presented the picture so thoroughly described by Fuchs, and are well shown in Bloom's illustrations of his case. In 12 of the 15 cases of hemorrhage following glaucoma-iridectomy the detachment disappeared after a time. In these cases with a benign course the clinical diagnosis had invariably been made of detachment due to transudation or leaking of aqueous as it is so often seen after cataract extraction. On the other hand, all four cases which had to be enucleated on account of persistent pain and so came to histological examination showed without exception a retro-choroidal hemorrhage as a cause of the detachment. This justifies the assumption which suggests that the clinical picture of hemorrhagic

detachment may simulate that of serous detachment, and differential diagnosis may be rendered still more difficult if the effused blood has begun to separate, as observed by Fuchs and again in my case, into a coagulum and supernatant serum. It is quite possible that small detachments due to retro-choroidal hemorrhages are more frequent after glaucoma-iridectomy than we have hitherto suspected from the small number of cases reported in the literature.

REPORT OF THE PROCEEDINGS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

By Mr. C. DEVEREUX MARSHALL.

An ordinary meeting was held at the Medical Society's rooms on Thursday, December 10, 1908, Mr. Marcus Gunn, President, in the chair.

The President made sympathetic reference to the recent sudden death of Dr. C. E. Beevor, the President of the Neurological Section of the Royal Society of Medicine, and one of the Original Members of the Ophthalmological Society, whose recent work on the arterial supply of different parts of the brain was of great importance. He paid a high tribute to Dr. Beevor's qualities as a physician, colleague, and friend.

Cases were shown as follows: Mr. Leslie Paton, **discoid cataract**; Mr. Priestley Smith, **improvements in the perimeter**; and Mr. Bishop Harman, **a test for binocular vision.**

Mr. Brooksbank James read a paper on **The operative treatment of strabismus.** He believed that most ophthalmic surgeons at the present day were agreed as to the importance of early orthoptic treatment, but there still appeared to be much difference of opinion as to the age at which operation should be done in the more obstinate cases, and as to the particular operation which should be performed. He criticised the after-treatment of tenotomy at the present day, which was far too casual. He himself rarely performed tenotomy, but when he did so, the case was treated in all respects like one of advancement, *i.e.*, binocular bandaging and rest in bed for six days. During the last few years he had confined himself to advancement of the external recti in convergent

strabismus, and advancement of the interni in the case of divergent strabismus, without tenotomy of the antagonists, and a deviation of 20% could be corrected by the advancement of one muscle. If he required to do more, he preferred to advance the muscle of the other eye later on, if orthoptic treatment did not render this unnecessary. His operative procedure was as follows: A vertical fold of conjunctiva was picked up with forceps *3mm* from the corneal margin and snipped off with scissors. Tenon's capsule was then opened below the tendon, and the latter seized with the Prince's forceps, excluding the conjunctiva. The tendon was then separated from the globe, its upper and lower attachments being lightly nicked with scissors, and the conjunctiva was then carefully peeled off its outer surface and allowed to retract. The stump of conjunctiva attached to the cornea was now thoroughly dissected up, together with the episcleral tissue, and the true scleral fibres exposed. A short, straight, flat, double-edged needle was now threaded with No. O white silk, and passed through the conjunctiva and Tenon's capsule, just below the lower border of the tendon and at a variable distance behind the attachment of the Prince's forceps, according to the effect desired. The needle was then passed vertically through the superficial fibres of the sclera for about *2mm*, as close to the corneal margin as possible. It was then carried backwards parallel to its original course, and emerged through the muscle capsule close to the free end of the retracted conjunctiva, about *2mm* above the point of entry. A similar thread was passed through the upper margin of the muscle, and emerged on its return through the capsule and conjunctiva, close to the upper border. The assistant then held the eyeball in the middle by forceps applied to the conjunctiva on the opposite side of the cornea, and at the same time he drew the Prince's forceps towards the corneal margin, so that the muscle lay against the eyeball. The operator then tied the threads. The Prince's forceps were then removed, and a portion of the extremity of the muscle cut off obliquely, so as to leave a raw surface in contact with the sclera. The conjunctiva wound was closed with a fine stitch. He claimed the following advantages for this operation: (1) The surgeon knew precisely what he had done by exposure of the sclera,

for unless the conjunctiva was peeled off from the sclera, he might be deceived as to the hold obtained by the ligatures. (2) The ligature knots lay at some little distance from the cornea, and so did not cause irritation of the latter. (3) The hold on both eyeball and muscle was firm. (4) The stitches were easy to remove, and, indeed, generally came away of themselves on the 9th or 10th day. In cases of divergent strabismus, he performed an advancement on one internal rectus first, and two or three months later an advancement on the other rectus. The dosage was regulated by the aid of the corneal reflex, the measurement of the distance at which the tendon was originally attached to the cornea, and the experience of the operator. In the case of operation on the internal rectus, the scleral stitch was first inserted, and the extremities of the threads were then carried backwards by curved needles. This was necessitated by the difficulty experienced in manipulating a straight needle in the confined space towards the inner canthus, this involving very little extra time. He had operated in some 35 cases, and where the squint did not exceed 20° he had obtained very satisfactory results by the advancement of the external rectus of the deviating eye alone. An important paper was published by Landolt in the French *Archives of Ophthalmology* for May last, in which there were recorded the results of advancement of both recti in 25 cases of strabismus. The results were remarkable and would no doubt lead to renewed interest in the subject by ophthalmic surgeons in this country. Mr. James finally referred to the importance of ascertaining the quality of the binocular vision in cases of strabismus, for which purpose he had found the distance stereoscope shown by him at the Society in January, 1907, to be most valuable.

Major Elliot, I.M.S., read a paper entitled: **Some observations on cataract extraction.** He confined his remarks to four main points: (1) The antisepsis of the conjunctival sac. In his last 1000 cases he had combined Lt.-Col. Herbert's method of irrigating the conjunctiva with 1 : 3000 perchloride solution with his own of carefully cleansing the conjunctival sac to its farthest extent with sterilized cotton-wool sponges mounted on cotton-wool sticks. The latter procedure was

carried out under a stream of warm boiled water. In this series of 1000 consecutive cases there had been only one case of suppuration, which was due to the fact being overlooked that an extirpation of the lachrymal sac performed by another surgeon had been incomplete, a portion of suppurating sac having been left behind. In this series the index of sepsis destructive to vision had been 0.42%, whilst if a doubtful case in which the failure of vision had been probably due to antecedent fundus changes were excluded, the index fell to 0.275%. The index of total septic incidence stood at 1.06%. He stated strongly his opinion that the methods of operation were of little importance compared with the vital necessity of keeping the wound area aseptic. (2) The laceration of the anterior capsule with a Bowman's needle before making the incision. For precision and safety in effecting the needling, for the easy sterilization of the instrument used, for the valuable information acquired as to the consistency of the cataract and the size of the nucleus (thus enabling the operator to graduate his size of incision accordingly), he considered this method had no equal. Leakage by the side of the needle need *never* occur if care be taken to use a needle whose blade does not exceed its shank in total area of cross section. It has been objected that the method is not suitable for dealing with Morgagnian cataract. In his opinion this is the very form for which it is most suitable, since the escape of lens fluid (1) deepens the chamber, and (2) indicates by its volume how large a nucleus one has to deal with. The idea that the milky fluid makes the direction of the knife difficult is a myth that has no foundation in practical experience. (3) The question of the remote danger of vitreous escape attending extraction. In deference to what he believed to be European opinion on this subject, he greatly dreaded the remote complication of vitreous escape. His own experience on the subject was small, since his vitreous loss percentage was very low (3% in cases in which the capsule was not removed subsequent to the extraction of the lens). If it could be shown that this dread of remote complication was unfounded, he thought there would be much to be said for the intracapsular operation advocated by Major Smith, I.M.S., and others. (4) The value of intraocular irrigation

by McKeown's method. He had used it now in well over 5000 extractions, and the whole series of 1000 cases above spoken of had been operated upon with the aid of this method of irrigation. He described some refinements of the method, and urged that the above series showed it to be free from danger, provided the operator were cleanly and careful. He considered it the one great advance in the perfection of the technique of cataract extraction during recent years. It was valuable alike for removing cortex of any description from the eye, and for completing safely and quickly the toilet of the iris and capsule.

Dr. BRONNER (Bradford) read a short paper on **Iridectomy in cases of acute iritis in which the pupil cannot be dilated.** Most text-books, he said, laid down the law that iridectomy should never be performed in cases of iritis so long as there was any inflammation present. Most surgeons were of the same opinion. The result was that in many cases of iritis the vision became permanently impaired by posterior synechiæ, opaque anterior capsule, and secondary glaucoma. Dr. Bronner recorded six cases of iritis in which iridectomy had been performed when there was well-marked inflammation present, and with excellent results. It was of great importance that in specific or rheumatic cases general treatment should be carried out most energetically. Iridectomy should be performed in all cases of iritis in which, in three or four days, the usual methods of treatment, 2% atropin ointment, dionin, leeches, hot fomentations, had not dilated the pupil or removed the pain, or in which there was the slightest increase of tension. It did not matter in the least if there was any inflammation present or not. Iridectomy caused decrease of inflammation and pain, broke down adhesions of the iris, and prevented opacities of the anterior capsule and secondary glaucoma. Cases of serous iritis and sympathetic ophthalmia should not be operated on.

REPORT OF MEETING OF THE SECTION ON OPHTHALMOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

By Dr. H. W. WOOTTON, Secretary.

MONDAY, NOVEMBER 16, 1908. DR. W. E. LAMBERT, PRESIDENT, IN THE CHAIR.

Dr. H. W. Wootton presented a case of **recent retinal detachment, treated by posterior sclerotomy, guided by the ophthalmoscope.**

The patient was first seen October 15, 1908. The detachment was situated to the temporal side and downward. The patient had first noticed a dimness of vision a day or two previously. There was but slight myopia, 4 to 5 D, and the patient had received no injury. The pupil could be transillumined with the Sachs lamp. As the case was so recent, it was decided to attempt a posterior sclerotomy. It was performed at the Manhattan Eye and Ear Hospital on October 18th. It was decided that if the knife were entered about 10*mm* behind the limbus, it would reach the middle of the detachment. In order to ascertain if this would really take place, Dr. E. L. Oatman viewed the fundus with the ophthalmoscope during the puncture. The knife was entered 10*mm* behind the limbus, and was distinctly seen to pass entirely in front of the detachment. It was withdrawn, and again entered 2 or 3*mm* farther back, when it could no longer be seen in the vitreous. Upon turning the knife so as to allow of the escape of the subretinal fluid, Dr. Oatman could distinctly observe the detachment gradually subside. The patient was kept in bed for two weeks, at the end of which time no detachment was visible. There were some opacities

in the vitreous, and a few deposits on Descemet's membrane. The field of vision for form was restored, but objects appeared somewhat blurred in the part of the field corresponding to the detachment. The patient was treated with atropin and mercurial inunctions. On November 14, 1908, redetachment slowly took place, and at the time of his presentation before the Section the detachment was distinctly visible anteriorly, but did not extend nearly as far back as it had originally.

Dr. W. B. JOHNSON asked if the present detachment included all of the original. Dr. H. W. WOOTTON replied that it did not by any means, and that much of the original detachment was still in place.

Dr. FRANCIS VALK did not understand why Dr. Wootton did not perforate the retina itself with the knife. Making a large opening through the retina he thought was preferable to a simple subretinal puncture.

Dr. W. B. MARPLE was skeptical about the permanency of results in any cases of detachment of the retina. He had tried dionin, and salt injections also, with no permanent results.

Dr. E. L. OATMAN stated that he had observed the knife enter the eye. One puncture was in front, and the other under the detachment. As to cutting the retina, all cases probably did not originate in a subretinal effusion. Some were due to a fluid vitreous, and in these cases cutting the vitreous was desirable.

Dr. JULIUS WOLFF presented a case of **epibulbar squamous carcinoma.**

Mrs. R. F., forty-eight years old, first seen in November, 1907, presenting a tumor underneath the skin of the right lower lid. This had grown steadily for some months and had received some local treatment elsewhere. No specific history; no tuberculosis. The tumor had about the size and shape of an almond, lying transversely underneath the skin of the lower lid, which was freely movable over the tumor. The lid margin was adherent to the eyeball so that the tumor could not be exposed to view. It could be felt to move together with the eyeball. Extirpation of the tumor was performed in December, 1907. An incision was made out-

wards from the outer canthus and the lid margin separated from the eyeball. Together with the tumor, all the bulbar conjunctiva below the cornea, as well as the conjunctiva, muscles, tarsus, and the whole margin of the lower lid, had to be removed. There was nothing left of the lower lid except some of the healthy skin, and this was laid up against the raw surface on the eyeball at a level of the lower corneal margin and allowed to attach itself there. Healing took place smoothly. X-ray treatment was applied two or three times a week for three months.

In July, 1908, the patient returned with a small, indurated ulcer at the inner angle just over the region of the tear-sac. This was excised, together with the tear-sac and all tissues down to the underlying bone. The resulting defect in the skin was covered by a plastic flap from above. The pathological report on the original tumor and that on the recurrent ulcer was squamous carcinoma. Healing took place smoothly, but the cicatrization drew the upper lid margin down so that it almost covered the pupil. In August a third operation relieved this condition, the lid being completely severed by a vertical incision from its nasal attachment and reattached with sutures at a point high enough to expose the pupil. In spite of the extensive removal of tissues, the cosmetic result was very good. The skin of the lower lid was firmly united with the eyeball; there was no impairment of motility and no lagophthalmus, and, unless inspected at very close range, the lid margin is not missed by the casual observer. There had been no recurrence up to the present time.

In the discussion of Dr. Wolff's case, Dr. W. B. MARPLE stated that he had shown a case of papilloma of the cornea two or three years ago, which had become carcinomatous. X-ray and radium had been tried, but neither had produced any permanent result. The eye was finally enucleated. Dr. WOLFF, questioned by Dr. W. E. LAMBERT, stated that he did not believe that the X-ray had produced any positive result in the healing.

Dr. W. E. LAMBERT stated that in one of his cases the X-ray had aided healing, apparently, in a miraculous manner.

Dr. JULIUS WOLFF stated that, in his case, the X-ray was not used until the wound was pretty well healed.

Dr. ALEXANDER DUANE presented **charts of the accommodation showing the need of revising some prevalent ideas.**

A diagram showed the actual range of accommodation found by Dr. J. B. Thomas and Dr. Alexander Duane in over four hundred cases at all ages. Their curve differs from Donders's curve, as ordinarily depicted in the text-books, in two particulars. In the first place, it rises higher at the start (reaching 18 instead of 14 D); in the second place, it does not touch the base-line or 0, even at the age of seventy. The reason for the first difference is that, while Donders measured the distance of the near point from the anterior principal point (practically from the anterior surface of the cornea), they measured it from the anterior focus of the eye. To make the two series of observations comparable, they had to change Donders's figures to what they would have been if he had measured from the same point that they did. The second point of difference arises from the fact that Donders's curve indicates the absolute position of the near point in his cases, no matter whether they were emmetropic or hyperopic, while the curve on the chart presented shows the difference between the near and far points—*i. e.*, the actual range of accommodation—in cases all of which were rendered emmetropic by glasses, so that the far point in all cases was at infinity. Again, to make the curves comparable, Drs. Thomas and Duane had to shift Donders's line, so as to show the absolute range as he found it in his cases. Their curve differs from that of Donders in two important particulars. From the age of 20 to 45, it rises above his; from 45 onward it falls below it—the latter difference being due to the sharp plunge that takes place between 40 and 50. The numerical difference between the two sets of observations was shown in a table.

Drs. DUANE and THOMAS believe that their results are superior in accuracy to those of Donders because:

(1) They were made from three times as many cases.

(2) Their patients were first rendered absolutely emmetropic by glasses, and no case was utilized in which the total refraction had not been carefully determined; while it is probable that many of Donders's cases, especially in the years between 30 and 45, had an uncorrected latent hyperopia,

which would make his estimate of the range too low by 1 or 2 D.

(3) The test-object they used for determining the near point was a fine hair line, which, as experiment showed, gives more accurate results than the fine print used by Donders.

These diagrams also illustrate certain erroneous ideas prevailing with regard to the accommodation. The first is the not uncommon one that according to Donders there is no accommodation after sixty. But what Donders really taught was that, while the near point recedes to infinity at this age, the far point recedes still farther (the person becoming hyperopic), so that there is still left, as shown in both Donders's original diagram and in the one presented a range of accommodation which amounts to 1.50 D or more (the observations of Drs. Thomas and Duane showed rather less).

In the second place, it is often assumed that the total actual accommodation present at 45 is only 4 D or so and is still less after that age. This idea runs through the text-books and is the basis of certain rules that have been laid down for the prescription of reading glasses. But if we accept the Helmholtz theory and Hess's deductions therefrom, we must admit that, while a man of 45 can change the shape of his crystalline lens only by an amount equivalent to a lens of some 4 D, he has a good deal more accommodative power left, which he can exert in contracting the ciliary muscle after the crystalline lens ceases to expand (latent accommodation). It is for this reason that a man of 45 or 50 can read without fatigue even when the book is close to his near point, for in doing this he is probably exerting not more than half of his entire accommodative power.

A third error, dependent upon the second, is that, inasmuch as a man of 45 is supposed to have little total accommodative power, he will not be able to overcome hyperopia, and hence all the hyperopia he has must be manifest. This, however, is certainly not the case, both theoretical reasoning and clinical observation showing the falsity of the view. Indeed, if we accepted Hess's ideas in their entirety, we should say that latent hyperopia at the age of 45 or 50 ought to be as common as it is at 15, and the necessity for using a cycloplegic as great in the one case as in the other. It is a

rather singular fact that the opponents of cycloplegics should appeal so confidently to Hess as the champion of their cause, when in reality his experiments furnish the strongest arguments for the use of cycloplegics in adults as well as in children.

In the fourth place, Hess himself seems to have fallen into an error regarding the accommodation, an error which leads one to doubt whether, in the later years of life, there is as much reserve accommodation as he thinks. He argues that a man of 48 has in reality about as much accommodative power (say 15 D) as a child of 15, only in the man the power is nearly all latent and in the child it is nearly all manifest. Now, he says, if the man of 48 has a paralysis of accommodation, it will produce no visible effect until it has become great enough to abolish all his latent accommodation (say 12 D); for not till then will it begin to affect his manifest accommodation and produce recession of his near point. In the child, on the other hand, in whom all the accommodation is manifest, a very slight paresis of accommodation will show itself at once. What would take place, in fact, was shown in a diagram. Three patients (aged respectively 5, 40, and 48) had the same total accommodation (15 D) and a manifest accommodation of 15.0, 5.0, and 2.5 D, respectively. In all three there developed a paralysis of accommodation which gradually increased and became complete in one hour. Then, on Hess's hypothesis, this paralysis produces and begins to produce an appreciable effect on the accommodation (recession of the near point) in, say, ten minutes in Case 1, thirty minutes in Case 2, and not till nearly an hour in Case 3. Now, plausible as this hypothesis seems, the facts are quite opposed to it. We have in homatropin an agent which causes a gradually increasing paralysis of the accommodation and which presumably acts on the ciliary muscle of the adult about as fast as it does on the ciliary muscle of the child. In most people, it produces no measurable effect in ten minutes, but does cause an appreciable recession of the near point in from twelve to fifteen minutes. Now, this initial effect on the manifest accommodation occurs as soon in the man of 48 as in the child of 15. This Dr. Duane has demonstrated over and over again. He exhibited two charts that show

this fact in a striking manner, and prove how even a slight paresis of accommodation is demonstrable in a man of 49.

In the discussion of Dr. Duane's paper, Dr. FRANCIS VALK asked if Dr. Duane had observed in these cases the subnormal accommodation mentioned by Gould. Dr. DUANE replied that he had observed the subnormal accommodation in young persons occasionally, especially associated with a low grade of asthenopia, conjunctivitis, and photophobia. There was sometimes a difference in the accommodative power of the two eyes, which might be as great as one dioptre when the eyes were tested separately.

Dr. FRANCIS VALK thought that this difference in the accommodation of the two eyes existed only when the refraction was different.

Dr. DUANE stated that sometimes a stronger glass for reading was necessary in the weaker eye. He believed that latent hyperopia can exist after forty, and also stated that the accommodative power might possibly vary in different countries, and that possibly we might become presbyopic sooner than people in some countries in Europe. This would not, however, answer for the rise of accommodative power found in the middle period of life.

Dr. PERCY FRIDENBERG read a paper entitled **vascular disease as a factor in embolism of the central artery of the retina,** reviewing the history of the subject from the clinical and microscopical investigations of Schweigger, Leber, and Haab, to the recent papers of Gunn, Harms, and De Schweinitz. Simple embolism is rare, and the clinical picture usually observed has been shown to depend on proliferating endarteritis or thrombosis. Occlusion of the vein with the picture of sanguineous apoplexy of the retina, similarly, depends in the great majority of cases on endophlebitis. A case of each of these severe forms of obstruction was reported by the writer with unmistakable evidence of beginning angiosclerosis in the unaffected eye. Gunn and others have described the irregularity of calibre, narrowing of lumen, "silver wire" appearance and tortuosity of vessels as early signs of local arteriosclerosis, with obscuration or compression of the veins where they are crossed by arteries. Later, white striations develop, and the vessels may appear as white cords. The

early changes may be detected in the retina when there is no systemic evidence of arteriosclerosis beyond increased blood pressure, an important sign. Aside from syphilis, gout, diabetes, and poisoning with lead, the most important etiological factors are alcohol, tobacco, tea, and coffee, physical exertion, mental stress, and emotional unrest. Senility alone is not so important. Retinal arteriosclerosis leads not only to obstruction, but very frequently to hemorrhages and glaucoma. Atrophy of the optic nerve and detachment have also been noted. Occasional obscurations of vision are seen in cases which go on to thrombosis, and this vascular spasm, the writer notes, is strikingly similar to the sign of intermittent claudication in arteriosclerotic gangrene of the lower extremities. In these cases, too, tobacco, tea, and long-continued interference with circulation have been found to be the main factors. The retinal circulation is considered an index of the condition of the cerebral vessels by De Schweinitz, Marple, Straub, and others. There is no doubt that the carotid and its branches are particularly susceptible to arteriosclerosis. Treatment of this form of vascular degeneration must include careful regulation of diet, limiting the amount of fluids and of extractives ingested, cutting down alcohol, tobacco, and coffee, or prohibiting them altogether, keeping the digestive tract free from accumulation of effete matter, and thus guarding against auto-intoxication, and warning against excitement, overwork, and excesses in diet. High tension is to be relieved with nitroglycerin and nitrites, and kept low with iodides. Calomel and saline cathartics are valuable adjuvants. We shall probably be able to add to these the lactobacilline preparations which have a specific action on intestinal decomposition, and the prescribing, as far as possible, of a purin-free diet.

In the discussion which followed, Dr. E. L. Oatman endorsed all that Dr. Fridenberg had said, and showed a photograph of obstruction of the central artery which confirmed Dr. Fridenberg's views. It represented the lumen of the artery containing a white thrombus behind an infiltrate of leucocytes in the intima, which had forced the intima inward, occluding the lumen. If the vessel had been cut through the thrombus, a beautiful picture of embolus would have been

presented. Probably there were no true cases of embolus on record, although the possibility of one must be admitted. Glaucoma in these cases must be due to the same cause as the thrombosis, namely, vascular degeneration. As to spasm, mentioned by Dr. Fridenberg, the question of primary spasm was very much questioned. In quinin poisoning, for example, the diminution in size as shown by Parsons was probably due to the withdrawal of blood into the abdomen.

Dr. ALEXANDER DUANE did not see how, clinically, one could doubt that sclerosis of the retinal vessels was a danger signal for the brain as well as for the kidneys. He had had a case with marked arteriosclerosis without retinal hemorrhages, in which complete blindness resulted in three hours, and this abolition was permanent.

Dr. H. H. TYSON stated that the youngest patient in whom he had observed embolism of the central artery was a young married woman, aged sixteen years, who was in the third month of pregnancy. The ophthalmoscope revealed the typical picture characteristic of the condition, with a very slight difference in the color of the fundus between the disk and macula. While the patient at the time of examination had only light perception in the affected eye, he prognosticated that she would probably get some vision, which later was realized by her getting tubular vision of $\frac{1}{200}$. This was the second case observed by him in which the macular vascular supply was restored. This case was observed by several other ophthalmologists, and she was examined at the New York Hospital and Sloane Maternity, and a careful history obtained, which was negative, and no apparent cause could be found to account for the condition. He thought it might possibly have been caused by a toxic condition induced by her pregnancy.

Dr. E. L. OATMAN stated that it ought to be noted that Dr. Loring was the first to question the diagnosis of embolus.

Dr. W. M. LESZYNSKY stated that the circulation in the eye did bear a relation to that of the brain, and a number of his cases had died of cerebral disease. Even where no changes in the superficial vessels could be noticed, sclerosis of the retinal vessels might be an evidence of disease of the cerebral arteries. We do not necessarily have high pressure

in all cases of arteriosclerosis. High pressure, if continuous, is dangerous to the vessels, and can cause arteriosclerosis. Alcohol was not a direct cause of arteriosclerosis, and, if a cause at all, must be considered as a very indirect one.

Dr. PERCY FRIDENBERG, in closing the discussion, stated that some authors supported the view of actual spasm of the retinal vessels, while others did not. He agreed with Drs. Duane and Leszynsky in regard to the importance of disease of the retinal vessels as a symptom of disease of those of the brain. Mauthner was the first to question the diagnosis of embolism.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE FOURTH QUARTER OF THE YEAR 1907.

By Dr. G. ABELSDORFF, in Berlin; Prof. ST. BERNHEIMER, in Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin; with the assistance of Prof. A. ALLING, New Haven; Prof. E. BERGER, Paris; Prof. CIRINCIONE, Genoa; Dr. DALÉN, Stockholm; Prof. HIRSCHMANN, Charcow; Dr. J. JITTA, Amsterdam; Mr. C. DEVEREUX MARSHALL, London; Dr. H. MEYER, Brandenburg; Dr. P. VON MITTELSTÄDT, Metz; Dr. H. SCHULZ, Berlin; Prof. DA GAMA PINTO, Lisbon; and Others.

Translated by DR. MATTHIAS LANCKTON FOSTER.

Sections IV.–VII. Reviewed by Dr. ABELSDORFF, Berlin.

IV.—ANATOMY.

485. BERNHEIMER. **Study of Gudden's commissure.** *Arch. f. Ophthalm.*, lxvii., 1, p. 78.

486. FLEISCHER. **Musculus retractor bulbi and a third lid in a human malformation.** *Anatom. Anzeiger*, xxx., p. 465.

487. TARTUFERI. **The existence in the cornea of elastic fibres that can be stained by Weigert's method.** *Annali di ottalmologia*, 1907, fasc. 9, 10, and 11.

488. JUSELIUS, EMIL. **The development of the posterior pigment epithelium of the iris in the secondary optic vesicle and the relation of the same to the musculature of the iris and to spontaneous iris cysts.** *Finsca lakaresallsk. Handl.*, 1907, p. 316.

BERNHEIMER (485, **Study of Gudden's commissure**) has employed for the study of Gudden's commissure the brains of rats with congenital bilateral anophthalmos, in which the entire optic tract failed to develop. The fact already ascertained experimentally that this commissure, which is closely connected with the chiasm, has nothing to do with

the optic fibres was confirmed in these rats' brains, in which the chiasm naturally was wanting. The principal part of Gudden's commissure is in relation with the internal corpus geniculatum, while a smaller number of fibres separate themselves from the main tract and, after winding about and permeating the base of the crura cerebri, radiate into the reticular layer of the optic thalamus and into the thalamus itself.

FLEISCHER (486, **Musculus retractor bulbi and a third lid in a human malformation**) found in the orbit of an infant with microphthalmos in addition to the normal external muscles of the eye a transversely striated muscle which arose from the lower surface of the optic nerve in the apex of the orbit, ran along its lower surface, and was inserted into its sheath *4mm* behind the opening of the sclera. Its nerve supply was through a minute branch of the oculomotorius. In the plica semilunaris there was found at the same time a little plate of cartilage and a gland homologous to one of Harder's glands. The author considers the muscle an atavistic remnant of the retractor bulbi, especially as the presence of a third lid cartilage, together with the constant relation between the retractor and the third lid, indicates the presence of a retractor.

For many years TARTUFERI (487, **The existence in the cornea of elastic fibres that can be stained by Weigert's method**) has sought to determine whether elastic fibres were demonstrable in the cornea by means of the usual methods of staining, and has found that with Weigert's method the presence of numerous elastic fibres is demonstrable in a well-defined and constant arrangement which forms in its entirety a true elastic framework of the corneal lamellæ. In addition he was able to determine that these elastic fibres arise directly from the fixed corpuscles of the cornea. CALDERARO.

JUSELIUS (488, **The development of the posterior pigment epithelium of the iris in the secondary optic vesicle and the relation of the same to the musculature of the iris and to spontaneous iris cysts**) has studied the origin and development of the sphincter in 11 human embryos and gives the following as the results he has obtained: (1) the development of the sphincter begins from the anterior ectodermal layer of the secondary optic vesicle when the fœtus has reached the length

of 8 or 9*cm*, and from cells which lie in the neighborhood of the place where the two ectodermal layers bend about the future pupillary opening; (2) the transformation of the ectoderm into musculature somewhat precedes, or is almost simultaneous with, (3) the change of the ectodermal layers into pigment epithelium, which commences in the anterior layer at the base of the iris and extends to the pupillary margin, where it passes over into the posterior layer and reaches the base of the iris in a fœtus 19*cm* in length. HELLGREN.

V.—PHYSIOLOGY.

489. HEINE. **The relations of refraction, accommodation, and internal tension of the eye in certain animals.** *Medicinisch.-Naturwissenschaft. Arch.*, i., No. 2, p. 323.

490. BETHE, A. **Observation concerning the personal difference between one and both eyes.** *Arch. f. d. ges. Physiologie*, No. 121, p. 1.

491. DIMMER, F. **The reflex streak on the blood-vessels.** *Klin. Monatsbl. f. Augenheilkunde*, xlv., p. 296.

492. TRENDELENBURG, W., and BUMKE, O., **Experimental studies concerning the Bach-Meyer pupil centres in the medulla oblongata.**

493. SAVAGE, G. C. **A further study of the so-called horopter, making ocular rotations very easy of understanding.** *Ophth. Record*, Dec., 1907.

494. MARRI, E. **Relative and absolute accommodation and the sense of the third dimension in the one-eyed.** *Annali di ottalmologia*, 1907, fasc. 9, 10, and 11.

495. MONTELLY, A. **Influence of the accommodation and convergence upon the perception of depth.** *Woprossy Philosophii i Psychologii*, May and June, 1907.

496. PENDRED. **A case of mirror writing.** *Lancet*, Jan. 4, 1908.

HEINE'S (489, **The relations of refraction, accommodation, and internal tension of the eye in certain animals**) studies confirm the principal results obtained by Beer. He finds that in the eyes of cephalopods the lens is moved backward for distant vision and moved forward for near vision. The change in position of the lens is produced by a change in the form of the globe. In fish there is only an accommodation for distance through retraction of the lens. In spite of the myopic refraction of the eyes of many fishes in a state of rest the freely swimming fish is not near-sighted, but is actively accommodated for distance. The absence of accommodation in the eyes of nocturnal fishes contrasts with the great range

of accommodation in smaller fishes, such as the gudgeon. In snakes accommodation for near is produced by displacement of the lens forward. Heine does not ascribe this displacement to increase of the pressure of the vitreous produced by contraction of the ciliary muscle, as suggested by Beer, but to the fact that with the contraction of the ciliary muscle and relaxation of the zonula the lens is not held back into the vitreous as before, and as the latter tries to assume a globular form it presses the lens forward. Not only in snakes, but also in the entire series of animals, it was demonstrated that the accommodation exerted no influence upon the intra-ocular tension, because after opening the vitreous space none of the contents of the eye was extruded on accommodation, and the mechanism of accommodation was not changed if only the form of the eye was not destroyed.

Bethe's (490, **Observations concerning the personal difference between one and both eyes**) observations clarify Mach's theory of the personal difference, that two things cannot be perceived at the same time. With momentary illuminations of large surfaces (Geissler's tubes and strips of paper) this personal difference shows itself as unequal lightening and therefore as subjective sensation of movement. When with great preponderance of one dimension of a surface the primary attention is directed to one end of the same the light seems to move from the point of attention toward the other end. This phenomenon is independent of the position of the places on the retina affected and is dependent only on the attention, for the points of attention and fixation can be separated from each other without production of any change. Interrupted light and darkness take their subjective points of exit from the place covered by the attention. With large surfaces without great preponderance of one dimension, the appearance of movement in momentary illumination consists of a brightening that rapidly extends in all directions from the point of attention with decrease of intensity, after which the light apparently draws back again into the point of attention. A determination of the distance used by the attention in order to move from one place to another gives $\frac{1}{4}-\frac{1}{2}$ of a second for a visual angle of 27–50°.

Dimmer (491, **The reflex streak on the blood-vessels**) refers to

his former studies which showed that the light streaks on the veins are due to a reflex from the anterior surface of the blood column, while those of the arteries are impressions of the axis current. The origin of the arterial reflex from the anterior surface of the axis current is not contradicted by Elschnig's observation that Poiseuille's space disappears immediately after interruption of the blood current. If the term axis current is used in contradistinction from Poiseuille's space, it represents all the remaining contents of the vessel, but in Dimmer's sense the axis current corresponds to the blood corpuscles pressed together in the most rapid current in the axis of the vessel, and is contrasted with the less rapidly moving peripheral portion of the blood stream. In warm-blooded animals (guinea-pigs) a similar reflex streak can be seen microscopically on the middle-sized vessels. In the human retina also the axis current is visible as a reflex streak. With transient arrest of the circulation by compression of the globe the reflex streak becomes smaller, while the small streak due to reflection from the anterior surface of the blood column appears in the place of the broad streak. The doubling of the reflex streak and the moving of the same in many places on the arteries during pulsation can be explained only by the interpretation of the reflex streak upon the artery as the impression of the axis current. In leucæmic individuals the axis current becomes visible in the veins also in the form of a broad streak, because of the pale color of the blood. The conditions are very favorable for the distinction of single groups of blood corpuscles in consequence of the slow blood current and the increase of the white blood corpuscles, so that by pressure on the globe of a leucæmic it is possible to perceive the breaking of the broad reflex streak into bright spots.

TRENDELENBURG and BUMKE'S (**Experimental studies concerning the Bach-Meyer pupil centres in the medulla oblongata**) experiments on cats show, contrary to Bach–Meyer's statements, that neither does loss of the light reflex follow section through the spinal end of the fourth ventricle, nor does myosis and slow reaction to light follow the laying bare of the fourth ventricle. Every section produced simply a dilatation of the pupil, which the authors explain as the result of the

intensive irritation of the sensitive tracts. They claim that narcosis alone can cause myosis and rigidity of the pupil in cats and that it is possible to induce a return of the light reaction and dilatation of the pupil by sensitive irritation.

SAVAGE (493, **A further study of the so-called horopter, making ocular rotations very easy of understanding**) considering it audacious to controvert Helmholtz while he was living has lately pointed out what he regards as fundamental errors in the reasonings of this authority. Listing's law, Helmholtz's poles, the law of direction and nodal points, Müller's horopter, and the multitude of errors arising from these misconceptions are not cleared away. ALLING.

MARRI (494, **Relative and absolute accommodation and the sense of the third dimension in the one-eyed**) describes his investigations of individuals who had lost the sight of one eye, or at least had had it very greatly reduced either by accident or by rapidly acting disease. For the study of the relative field of accommodation he used Ferris's asthenoptometer, for that of the sense of depth Tschermak's apparatus. His conclusions are as follows:

a. The extent of the field of relative accommodation in the one-eyed immediately after the effect of the pathological cause, or of the traumatism, is within smaller limits than normal as compared with control of individuals.

b. With the lapse of time the extent of the relative accommodation undergoes a progressive increase until it equals and even exceeds that of individuals who have intact binocular vision and physiologically normal refraction, and the farther forward one goes the more does the sound field in the one-eyed strive to equal the total extent of the absolute accommodation and to fuse with it.

c. The sense of depth shows a greater reduction when the monocular condition is recent than in individuals who have been made monocular artificially and momentarily for the purpose of comparison, and this defect is in lower limits than the proportionate reduction of the extent of the field of relative accommodation in the same person.

d. The sense of depth undergoes with the lapse of time a continuous and progressive improvement in individuals who are permanently monocular, contrary to the results ob-

tained by other authors. In the majority of cases this appearance is in direct connection with the progressive increase of the field of relative accommodation. CALDERARO.

MONTELLY (495, **Influence of the accommodation and convergence upon the perception of depth**) sums up the results of his experiments in the following manner. The indubitable criterion for the estimation of depth is the muscular sense in accommodative movements. HIRSCHMANN.

PENDRED (496, **A case of mirror writing**) has been consulted about a child aged six who has been learning to write for six months. From a copy the child writes correctly, but if left to himself he writes backwards from right to left, and reverses the letters. Seen in a looking-glass the writing is normal. He reads with equal facility both the normal and abnormal caligraphies. In sums he makes an extraordinary confusion of figures, some being orthodox, the others mirror figures. In conversation Pendred tells me that since he published the case he has had several letters on the subject and finds that he has only drawn attention to a common defect in children. In every school there seem to be children who prefer to write orientalwise from right to left and some reverse the letters. The case cited was a right-handed child. The paper is illustrated with examples of the child's writing.

T. HARRISON BUTLER.

VI.—REFRACTION AND ACCOMMODATION.

497. DELORD and REVEL, P. **Paralysis of the accommodation in diabetes.** *Archives d'opthalmologie*, xxvii., p. 764.

498. PERCIVAL, A. S. **Spectacles in ametropia after removal of the lens.** *British Medical Journal*, Dec. 21, 1907.

499. ALEXANDER, G. F. **Mechanism of accommodation and the function of the ciliary processes.** *Ophthalmic Review*, Dec., 1907.

DELORD and REVEL (497, **Paralysis of the accommodation in diabetes**) observed the sudden onset of a bilateral paralysis of the accommodation with intact function of the sphincter pupillæ in a woman forty-eight years old suffering from diabetes mellitus. Contrary to the opinion of Wecker and Landolt these authors agree with Schmidt-Rimpler that paralysis of the accommodation in diabetes is rare. It is certain that the absolutely bad prognosis as to life ascribed

to this condition in diabetics by Moore and Stoeber is not correct, as in the author's case there was a complete recovery from the paralysis of accommodation with simultaneous improvement of the general condition. The authors believe that in their case the paralysis of accommodation must be ascribed to a central localization of the toxic lesion of the nerve substance, though it could also be explained by Edinger's theory of the localization of the peripheral toxic neuritis in the functionally severely overstrained muscle of accommodation, as the patient had 3.5 D of hypermetropia.

BERGER.

PERCIVAL (498, **Spectacles in ametropia after removal of the lens**). The glass required to correct the remaining error of refraction after removal of the lens in high myopia can be found from the following formula provided that the curvature of the cornea has not been altered by the operation.

D = glass required before the operation.

x = glass required after the operation.

$$x = \frac{25+D}{2-0.01D}$$

Thus a myope who was corrected by -18 D would theoretically require after the operation about $+3.56$ D.

$$x = \frac{25-18}{2+.18} = \frac{7}{2.18} = +3.21\ D$$

The paper does not state that the signs are to be treated algebraically, but the examples given show that this is what the author intends. T. HARRISON BUTLER.

ALEXANDER (499, **Mechanism of accommodation and the function of the ciliary processes**) does not believe that the universally accepted theory of the action of the ciliary muscle upon the elastic traction of the zonule of Zinn as enunciated by Helmholtz is the true mechanism of accommodation. It does not account for asthenopia. He suggests a different solution. Let us imagine an elastic bag filled with water surrounded by a network of string. Let the bag be placed against a hole in a piece of wood, and let strings from the circumference of the bag be led through holes bored round

the circular aperture, and united into a common strand. If this be pulled upon the bag will bulge through the opening, its convexity increasing as the opening is made smaller. The hyaloid membrane, the zonule of Zinn, the suspensory ligament, and the anterior capsule contribute such a bag.

The ciliary ring is comparable to the hole in the piece of wood, *the choroid to the cord network*, and the ciliary muscle to the strands of string.

The radiating fibres of the ciliary muscle by their traction on the choroid cause a forward bulging of the suspensory ligament and anterior capsule with increase in their convexity, and this effect is exaggerated by the narrowing of the ciliary ring, resulting from the sphincter-like action of the circular fibres of the ciliary muscle. Positive pressure is exerted upon the lens equator and it is slightly advanced. Its anterior surface is thus advanced, and rendered more convex while the increased convexity of its posterior surface annuls the effect of the advancement.

Alexander advances no evidence experimental or otherwise in support of his theory, which seems to rest upon the supposition that a few presbyopics suffer from asthenopia.

The choroid being compared with the network it would appear that the whole vitreous takes part in the act of accommodation. Any rise of tension in the eye, whether produced by pressure of the finger or otherwise, should make the eye strongly myopic. We know that in glaucoma this is not so, the amplitude of accommodation is diminished.

T. HARRISON BUTLER.

VII.—MUSCLES AND NERVES.

500. FUCHS, E. **Oculomotor paralysis without involvement of the internal muscles in peripheral lesions.** *Arbeiten aus dem Neurol. Institut a. d. Wiener Universitaet. Festschrift*, 1907.

501. WOLFF, H. **Paralysis of the abducens after lumbar anæsthesia.** *Berliner klinische Wochenschrift*, 1907, No. 41, p. 1305.

502. BIELSCHOWSKY, A. **The reflex character of the movements of the eye, together with a contribution to the symptomatology of visual paralyses.** *Klin. Monatsblaetter f. Augenheilkunde*, xlv., Beilageheft, p. 67.

503. POSEY, W. C. **Congenital squint.** *Jour. Amer. Med. Assoc.*, Oct. 26, 1907.

504. COULTER, R. J. **The treatment of alternating squint.** *Ophthalmoscope*, Nov., 1907.

505. HALTENHOPF. **Double ptosis of the eyelids and almost complete paralysis of all the motor muscles of the eyes probably dependent on an anterior polioencephalitis.** *Soc. med. de Genève*, Nov. 14, 1907.

506. SAUVINEAU, CH. **Ocular paralyses and pupillary troubles with affections of the ear, the sinus, and the teeth, in the course of broncho-pulmonary and cardio-aortic diseases.** *Ann. d'ocul.*, cxxxviii., p. 321.

FUCHS (500, **Oculomotor paralysis without involvement of the internal muscles in peripheral lesions**) has collated from literature 6 cases with and 12 without autopsy in which the internal muscles alone were spared in peripheral paralysis of the oculomotorius. To these he adds 5 clinical observations of his own. 1. Basal meningitis with oculomotor paralysis on the left side. 2. Paralysis of the left oculomotorius with herpes zoster ophthalmicus on the left side. 3. Inflammation of the orbit with exophthalmos and paralysis of the left oculomotorius. 4. Empyema of the ethmoid with paralysis of the right oculomotorius. 5. Probable empyema of the ethmoid with bilateral oculomotor paralysis and exophthalmos on the right side.

The medial position of the fibres that supply the internal muscles cannot be accepted generally as the cause of their greater power of resistance because: 1. The acceptance of this position is based on a condition found by Ackermann of constriction of the atrophic oculomotorius before its passage through the dura with preserved function of the internal muscles and with the fibres in the median third anatomically intact. But we know nothing of the position of these fibres in the rest of the nerve. 2. The central fibres are in no way specially protected against the effect of pressure; on the contrary, the papillo-macular bundles of the optic nerve, which lie in the middle in posterior sections of the nerve, are sometimes the first affected by tumors. This special vulnerability is inversely to the lesser vulnerability of the fibres supplying the internal muscles. This acceptance of the centripetal pupillary fibres has long served to explain the reaction of the pupils to light in neuritis or optic atrophy with lost perception of light.

WOLFF (501, **Paralysis of the abducens after lumbar an-**

æsthesia) intended to use lumbar anæsthesia on a man thirty-six years old for an operation on the knee-joint, but as blood escaped instead of cerebrospinal fluid he did not inject stovain but gave chloroform. On the fifth day after the operation paralysis of the abducens of the right eye appeared which passed away at the end of ten weeks. Hence paralysis of the abducens followed a simple lumbar puncture, and this observation furnishes a subject for serious consideration as to what part the puncture, and what the injected anæsthetic plays in the production of the after-symptoms.

BIELSCHOWSKY (502, **The reflex character of the movements of the eye, together with a contribution to the symptomatology of visual paralyses**) says that the clinical complex of symptoms presented by paralysis of the ocular muscles as a rule leaves to be answered only the question whether the paralysis is supranuclear or peripheral (nuclear, fascicular, basal). The principal characteristic of the supranuclear disturbances is that the affected eye muscles are paralyzed for certain innervations but respond to others. As a rule, two muscles associated in the performance of a certain action of the two eyes are more or less equally affected. A perfect equality of the faulty motility on both sides is as good as irreconcilable with the theory of a nuclear affection, while inversely unequal disturbances of function of associated muscles are not irreconcilable with supranuclear affections. The nearer the focus is to the brain the more unequally may the associated muscles be affected. Foci in the pons can affect only the internus of one, or the externus of the other eye. From the fact that in associated visual paralyses the eyes cannot be turned laterally at command but can follow an object moved in the named direction, the conclusion cannot be drawn that this following should be contrasted to the voluntary movements as a reflex movement, it may rather be designated an optic reflex. But the course of this optic reflex runs over the cortex, and its centrifugal tract begins in the cortical visual centres, because the light stimulus first excites movements of the eye through mediation of sensations of light, which is to be considered as a function of the cortex. In any case in which a following of an object is still demonstrable, it is possible that the usual tracts of innervation for

certain visual movements are interrupted and other pre-existing tracts are used instead.

In contrast to the optic reflex we also recognize eye movements of true reflex character, the centripetal tract of which begins in the semicircular canals of the labyrinth (nervus vestibularis). These reflex eye-movements with passive rotations make the supranuclear character of a visual paralysis evident. Not rarely the encroachment of the supranuclear focus upon the nucleus may be recognized through the more or less equal loss of reflex excitability of the affected muscles.

Posey (503, **Congenital squint**) finds the causes of this form of squint either central or peripheral. Among the former will be found aplasia of the nuclei of the nerves or of the nerves themselves, the underlying occasion for which is often obscure. Peripheral causes may be absence of the muscle or replacement with a cord of connective tissue or an abnormal course or insertion of the muscle. In some instances the defect appears in different members of the family although not always in the same form. There is further to be observed in all these cases a faulty development of the orbit on the side of the defective muscle. Posey has found this form of strabismus in about 0.32 % of his cases. He gives cases illustrative of the various types which may be assumed by this class of anomalies. Alling.

Coulter (504, **The treatment of alternating squint**) thinks that in dealing with alternating squints which have become permanent the best course is to correct the deformity by operation, and then to make every effort to obtain fusion of images and binocular vision by orthoptic training with the amblyoscope or stereoscope. The most suitable time to undertake such treatment is between twelve and sixteen years of age.

Coulter has been successful in obtaining fusion of stereoscopic pictures in all his cases. T. Harrison Butler.

Haltenhoff (505, **Double ptosis of the eyelids and almost complete paralysis of all the motor muscles of the eyes probably dependent on an anterior polioencephalitis**) reports the case of a man thirty-eight years old who since his thirteenth year had had bilateral ptosis and bilateral paralysis of all the external muscles of the eye, while the sphincter pupillæ

and the muscle of accommodation remained intact. At this time he was seized with paralysis of the flexor muscles of the arms, first of the left arm, later of the right. Haltenhoff ascribes the sudden onset of the paralytic symptoms in the eye to an acute bilateral hemorrhagic polioencephalitis anterior, while Bard refers the paralysis of the flexor muscles of the arms to a cortical encephalitic focus. BERGER.

SAUVINEAU (506, **Ocular paralyses and pupillary troubles with affections of the ear, the sinus, and the teeth in the course of broncho-pulmonary and cardio-aortic diseases**) speaks of the clinical symptoms exhibited by the pupils and ocular muscles in diseases of the ear, of the accessory sinuses, and of the teeth met with in the course of diseases of the respiratory passages and of the circulatory organs. He particularly calls attention to reflex paralyses in diseases of the ear, in which the reflex action is supposed to be transmitted from the fibre of the trigeminus, or of the vestibular nerve, to Deiter's nucleus and thence to the nucleus of the ocular muscle. He describes a case seen by himself and Furel which he explains in this way. Paralysis of the abducens is particularly frequent in diseases of the ear. Among the reflex ocular symptoms produced by diseases of the ear he enumerates strabismus with diplopia, myosis, nystagmus, and disturbances of the accommodation. BERGER.

Sections VIII.–XII. Reviewed by Dr. R. SCHWEIGGER. Berlin.

VIII.—LIDS.

507. CASTELAIN, O. **Peculiar infection of the margin of the lid (streptothricosis meibomian).** *Annales d'oculistique*, cxxxiii., p. 261.

508. CHAILLOUS, J., and POLACK, A. **Erythematous lupus of the margin of the lid.** *Soc. d'ophtalm. de Paris*, Dec. 3, 1907.

509. SALUS, ROBERT. **A case of malignant œdema of the eyelids.** *Prager mediz. Wochenschrift*, 1907, p. 46.

510. MORAX, V. **The prognosis of malignant pustule of the lids.** *Annales d'oculistique*, cxxxviii., p. 338.

511. CHAILLOUS, J. **Contracture of the levator palpebræ, with paralysis of the elevation of the lid and of convergence. Elongation of the levator.** *Annales d'oculistique*, cxxxviii., p. 254.

512. CHAVERNAC, H. **A curious and rare form of symmetric tumors of the lids.** *Annales d'oculistique*, cxxxviii., p. 417.

513. Wieder, H. S. **Sarcoma of the eyelid, with report of a case.** *N. Y. Med. Jour.*, Nov. 23, 1907.

514. Shoemaker, W. T. **Observations on the Motais operation for ptosis. Report of three cases.** *Annals of Ophthalmology*, Oct., 1907.

Castelain (507, **Peculiar infection of the margin of the lids**) observed a disease of the margin of the lid in a spinner fifty-seven years old which presented the clinical symptoms of actinomycosis. The bacteriological examination revealed the presence of the streptothrix described by Axenfeld and of pneumobacilli. Berger.

Chaillous and Polack (508, **Erythematous lupus of the margin of the lids**) presented a patient forty years of age who had had for ten years an erythematous lupus of the margins of the lids. The ophthalmo-reaction with tuberculin gave a negative result, and yet there was a rise of temperature of 1.5° after a subcutaneous injection of tuberculin. Berger.

The malignant œdema observed by Salus (509, **A case of malignant œdema of the eyelids**) extended little beyond the lids of the affected eye, but was associated with a high fever. The skin of the lids became necrotic, but was quickly restored, producing some contraction of the lid space, lagophthalmos, and ectropion. The diagnosis is to be made by means of the bacteriological examination. The etiology remains obscure frequently. Therapeutically disinfectant applications were made in this case. It may also be treated surgically and serotherapeutically.

Morax (510, **The prognosis of malignant pustule of the lids**) observed a malignant pustule of the left upper lid of a man, twenty-four years old. Recovery followed destruction of the diseased area with the galvanocautery and injections of potassic iodide in its neighborhood. In an analogous case described by Menetrier and Clunet recovery likewise followed the use of the anti-malignant-pustule serum obtained from the Pasteur Institute. A review of the reported cases of malignant pustule, 42 in all, shows that death resulted in 30%, so that the prognosis as regards life is probably about the same as when malignant pustule is situated in other parts of the body. Berger.

Chaillous (511, **Contracture of the levator palpebræ, with paralysis of the elevation of the lid and of convergence**) de-

scribes a case of contracture of both levatores palpebræ met with in a woman sixty-two years old and complicated with a paralysis of elevation of the lid and of convergence. Similar cases have been described by Chevallereau and by Truc, but in Truc's case alone was there a paralysis of the elevation of the lid. Truc obtained a good result by tenotomy of the levator. BERGER.

CHAVERNAC (512, **A curious and rare form of symmetric tumors of the lid**) describes a case seen by his father of symmetric tumors of both lower lids which appeared in a young woman after confinement and increased in size after two more confinements. The tumors were successfully removed by operation. Chavernac believes that this was a case of elephantiasis of the lids brought about by repeated puerperal streptococcus infection. It presents many points of resemblance with the case reported by Fromaget in 1906.

BERGER.

WIEDER'S (513, **Sarcoma of the eyelid with report of a case**) case is among the youngest reported, the child being only seven weeks when the tumor was noticed. It was a lipoma which underwent sarcomatous degeneration. The author has been unable to find more than forty-four cases of sarcoma of the lid, evidently overlooking a recent publication with references to sixty-five. ALLING.

SHOEMAKER (514, **Observations on the Motais operation for ptosis. Report of three cases**) believes that this operation, though difficult, is capable of being done with great exactness as to results. It consists essentially in the transplantation of the middle third of the superior rectus tendon into the upper lid, between the tarsus and the skin. He suggests an additional incision through the skin of the lid, to facilitate the attachment of the rectus tendon to the tarsus. A small, poorly developed tendon is a positive contra-indication. The first case which he reports was a partial success, the next a failure through tearing of the sutures, while the third was entirely satisfactory. ALLING.

IX.—LACHRYMAL PASSAGES.

515. WAGNER, RICH. **Contributions to the pathology of the lachrymal sac.** *Inaug.-Diss.*, Tuebingen, 1907.

516. Koster, Gzn. W. **The permanent drainage of the lachrymal passage.** *Archiv f. Ophthalmologie*, lxvii., No. 1, p. 87.

517. Lotin, A. W. **Treatment of fistulæ of the lachrymal sac by electrolysis.** *Westn. Ophthalm.*, 1907, No. 6.

518. Almblad, E. **A case of gumma in the lachrymal sac.** *Hygeia*, 1907, p. 525.

Wagner (515, **Contributions to the pathology of the lachrymal sac**) reports a case of true mucous membrane polyp in the lachrymal sac which had developed probably in consequence of a fracture of the neighboring bones. Other cases, clinically similar to this, show that thick lachrymal sacs that exude little or no secretion may be distended by a tumor or by submucous infiltration of the connective tissue. Likewise tuberculosis of the lachrymal sac may often be suspected, as in the four cases described by Wagner, in which certainty could be obtained only through the microscopic examination. Twice the lachrymal sac appeared to have been infected from tuberculous bones.

Koster (516, **The permanent drainage of the lachrymal passage**) passes silk threads through the lachrymal canal, brings the lower end out of the nose, ties it with the upper end, and daily applies silver nitrate, or some other remedy, to the portion usually lying in the sac, after which it is replaced. His results are rapid and frequently complete after the thread has been worn ten days. An average of four weeks is necessary for a cure. The method is indicated in chronic blennorrhœa when extirpation cannot be performed, in dacryocystitis with formation of fistula after the acute process has been subdued, in recurrent cysts in the lachrymal sac after their division, in old stenoses, in traumatic stenoses, congenital and other impermeable strictures, and stenoses where, after the customary probing, adhesions reappear, cases in which the threads must be used a long time, in bony necroses in the duct of lachrymal bone, in epiphora in spite of nasal treatment because the outlet into the nose is changed or obstructed, in recurrences of stenoses and strictures after lachrymal diseases of various kinds.

Lotin (517, **Treatment of fistulæ of the lachrymal sac by electrolysis**) recommends electrolyses for the dilatation of strictures of the lachrymal canal and to cure lachrymal

fistulæ. A probe connected with the cathode is introduced into the canal while the anode, covered with cotton wet with salt solution, is introduced into the corresponding nostril. A current of 5 or 6 milliamperes is gradually made and broken. For the closure of fistulæ a platinum wire connected with the anode is introduced through the fistula so as to touch the probe in the canal, while the cathode is placed in the nostril. A current of 5 milliamperes is used. The sittings continue for from three to five minutes and are repeated every week. The advantages of the electrolytic treatment are: it is of shorter duration than probing; the sittings are less frequent; it produces a permanent dilatation of the lachrymal canal. Many cases of dacryocystitis and stenosis which have proved obstinate to the usual methods of treatment can be cured in this manner. The purulent secretion in blennorrhœa of the lachrymal sac often disappears after the first sitting. The more rapid healing of lachrymal fistulæ by electrolysis than by probing and washing seems to be due to the more rapid restoration of the permeability of the canal and the bactericide action of the electrolysis. Electrolysis with the cathode for five or six minutes with a current of 4 or 5 milliamperes gradually increased and diminished by means of the rheostat is absolutely without danger. HIRSCHMANN.

ALMBLAD (518, **A case of gumma in the lachrymal sac**) found an indolent tumor in the lachrymal sac of a man forty-three years old, who had had an overflow of tears in one of his eyes for twenty years, which on section showed a fatty white surface. After several weeks of antisyphilitic treatment the tumor completely disappeared. HELLGREN.

X.—ORBITS AND ACCESSORY SINUSES.

519. MORAX, V. **Sarcoma of the orbit and of the middle cerebral fossa. Hemianopsia and hemianopic pupillary reaction from compression of the optic nerve behind the chiasm.** *Annales d'oculistique*, CXXXVIII., p. 264.

520. BOCCHI. **Contribution to the therapy and pathology of primary melanosarcoma of the adnexa of the eye.** *Annali di ottalm.*, 1907, fasc., 6, 7, 8.

521. CARLOTTI. **Traumatic arterio-venous aneurysm of the orbit.** *Soc. d'ophtalmologie de Paris*, Nov. 5, 1907.

522. Eysen, J. **Treatment of traumatic pulsating exophthalmos.** *Inaug. Diss.*, Berlin, Jan., 1908.

Morax (519, **Sarcoma of the orbit and of the middle cerebral fossa. Hemianopsia and hemianopic pupillary reaction from compression of the optic nerve behind the chiasm**) met with, in a man forty years old, a tumor of the middle fossa which extended into the orbit and by compression of the right tract caused homonymous hemianopsia and hemianopic pupillary reaction on the left side. The fibres of the tract showed no signs of degeneration, although macroscopically there was a great change of the optic tract from pressure. The tumor (sarcoma) caused an arching forward of the temple.

Berger.

Bocchi (520, **Contribution to the therapy and pathology of primary melanosarcoma of the adnexa of the eye**) reports two cases of primary melanosarcoma, one of the orbit, the other of the conjunctiva bulbi. In the first case the tumor jutted out beneath the right orbital arch and caused an exophthalmos forward and downward. It was removed through an incision in the upper lid without injury to the eye. The superior rectus must have been taken away with the tumor. Microscopically it proved to be a melanotic fibrosarcoma. The other, of a reddish brown color, situated in the upper scleral region, where it encroached on the cornea, was dissected away as deeply as possible from the sclera and cornea. The diagnosis of melanotic sarcoma was confirmed microscopically. Recurrence took place after about a year when it was again removed and the sclera cauterized. Bocchi presents his views both as to the relative benignity of the course in these cases and as to the pigment which he studied chemically. Calderaro.

Carlotti (521, **Traumatic arterio-venous aneurysm of the orbit**) reports a case of traumatic arterio-venous aneurysm of the orbit in which six injections of gelatine serum produced a marked improvement. The exophthalmos was decreased, the movements of the ball gained an almost normal excursion with the exception of the abduction, and the patient was enabled to return to work. Berger.

According to Eysen's (522, **Treatment of traumatic pul-**

sating exophthalmos) compilation of 167 cases, about 4% recovered spontaneously, 10% were cured, and 6% were improved by finger compression of the carotid. Ligation of the carotid failed in a quarter of the cases operated on, in one half it produced only an improvement. Its chances are about 10% better if performed after preliminary finger compression. The most promising operative treatment is in the orbit, necessarily after Kroenlein's temporary resection, ligation of the ophthalmic vein with resection of the vein or of the aneurysmal sac.

XI.—CONJUNCTIVA.

523. Fox, L. Webster. **The radical cure of vernal conjunctivitis.** *Ophthalmic Record*, Nov., 1907.

524. Posey, W. C. **A case of vernal conjunctivitis showing unusual corneal complications.** *Annals of Ophthalmology*, Oct., 1907.

525. Reis, Wilh. **An atypical picture of vernal catarrh with remarks concerning the histo-pathology of this disease.** *Klin. Monatsbl. f. Augenheilkunde*, xlv., supplement, p. 144.

526. Axenfeld and Rupprecht. **Comments on the preceding article of Reis on vascular changes in vernal catarrh.** *Ibid.*, p. 172.

527. McKee, H. **A clinical study of five hundred cases of conjunctivitis.** *Amer. Jour. Med. Sci.*, Nov., 1907.

528. Wharton, J. **The etiology of ophthalmia neonatorum.** *Ophth. Review*, Nov. and Dec., 1907.

529. v. Herff, O. **Can the number of cases of gonorrhœal ophthalmia be diminished?** *Gynaekologische Rundschau*, No. 1, p. 19.

530. Igersheimer, J. **Contribution to the pathology of conjunctival diphtheria.** *Archiv f. Ophthalmologie*, lxvii., No. 1, p. 162.

531. Noll, H. **Diphtheria of the conjunctiva and cornea in an adult.** *Archiv f. Augenheilk.*, lix., No. 1, p. 14.

532. Prowazek. **Trachoma in Java.** *Aerztl. Verein, Hamburg*, Nov. 19, 1907.

533. Carbone, A. **Trachoma and rhinitis.** *Giornale della R. Accademia di Medicina di Torino*, 1907, xiii., fasc. 1 and 2.

534. Burzew, N. Z. **Casuistics of subconjunctival tumors (lipoma, sarcoma).** *Westn. Ophthalm.*, 1907, No. 6.

Fox (523, **The radical cure of vernal conjunctivitis**) proposes grattage, scarifying the granulations with a three-bladed knife and then scrubbing with a tooth-brush. In ten cases the disease had not recurred after five years and the cure was permanent. He apparently does not treat the circumcorneal manifestations. Alling.

Posey's (524, **A case of vernal conjunctivitis showing unusual corneal complications**) case was marked by irregular opacities of the cornea, apparently made up of hyaline degeneration of the epithelium with blood-vessels encroaching upon the cornea from the limbus. It is possible that such a condition may have arisen from the energetic treatment which the patient had previously received in the form of caustics. Alling.

Reis's (525, **An atypical picture of vernal catarrh with remarks concerning the histo-pathology of the disease**) case of vernal catarrh was unilateral and associated with excessive changes in the tarsal conjunctiva and an ulcer of the cornea. The proliferations recurred after removal. A peculiar histological condition was present in the endothelia of the vessels, especially of the small, so-called precapillary arteries and transition vessels. At the same time very fine, newly formed fibres penetrated between the increased and swollen intima endothelia.

Axenfeld and Rupprecht (526, **Comments on the preceding article of Reis on vascular changes in vernal catarrh**) agree with Reis that vascular changes were present at the bases of the papillæ, but consider his case to be too unusual to allow the observation to have general value.

The results of McKee's (527, **A clinical study of five hundred cases of conjunctivitis**) examinations are as follows: Morax-Axenfeld diplobacillus, 200 times; pneumococcus, 13; gonococcus, 10; Koch-Weeks, 7; influenza bacillus, 3; meningococcus, 1; McKee's bacillus, 9; micrococcus catarrhalis, 12; streptococcus, 24; staphylococcus, 50; bacillus coli, 5; bacillus xerosis, Hoffman's bacillus, and saprophytes, 102. Negative results, 64 cases. Alling.

Wharton, J. (528, **The etiology of ophthalmia neonatorum**) gives an historical account of the disease, and then discusses the methods of infection both *primary* before delivery and *secondary* after delivery. He then reviews the nature of the infection and the micro-organisms discovered in the discharge. He has personally studied 100 cases, examining both the child's eyes and the mother's genitalia bacteriologically. His conclusions are:

(*a*) The majority of the cases (in his series 75%) result from gonococcal infection, and the inflammation is usually severe. Other organisms, notably pneumococcus, may cause a milder form of inflammation.

(*b*) The source of infection is usually an abnormal secretion present in the vaginal tract of the mother.

(*c*) The absence of leucorrhœa does not exclude gonorrhœa.

(*d*) Infection may arise from the inoculation with sputum, filth, etc.

One case of pneumococcal infection was directly traced to the mother's sputum. T. HARRISON BUTLER.

V. HERFF (529, **Can the number of cases of gonorrhœal ophthalmia be diminished?**) has tried protargol, argyrol, and sophol as prophylactics and recommends sophol, at first in 10% solution, afterwards in 5%, because of the slight amount of irritation it produces, its certain action, and its durability. In his practice the blennorrhœas have decreased about 80%, while the number of other diseases remain about the same.

IGERSHEIMER'S (530, **Contribution to the pathology of conjunctival diphtheria**) cases occurred in two children in which the croupous form of inflammation passed over into the diphtheritic, thus showing the identity of the two. An increased supply of blood to the conjunctiva is the first symptom of the inflammation. Then follow formation of membrane and a high-grade anæmia, superficial necrosis, then deeper necrosis with fibrinous exudation in the tissues of the lids as deep as the subcutaneous tissue. Only in the dense connective tissue of the tarsus does the excretion of fibrin meet with difficulties. Bacteriologically he found indubitable diphtheria bacilli, and on the surface of the conjunctiva staphylococci penetrating to different depths into the tissue. He considers the mixed infection to be the usual form in conjunctival diphtheria, yet great importance should be ascribed to the cocci for the appearance of the entire process.

NÖLL (531, **Diphtheria of the conjunctiva and cornea in an adult**) met with a diphtheritic conjunctivitis with virulent diphtheria bacilli with no signs of the disease elsewhere in a woman sixty-one years old. There was no rise of temperature and no great effect on the general condition even at first. A sickle-shaped ulcer of the cornea, running parallel to its

margin, formed during the course of the disease, but cleared up in a short time so that final recovery was with perfect vision.

The conditions found by PROWAZEK and HALBERSTAEDTER (532, **Trachoma in Java**) in fresh cases of trachoma are little enclosures stained red by Giemsa's method in blue areolas close to the nucleus of epithelial cells. They enlarge rapidly, swell, and burst the cells so that the corpuscles enter the secretion and produce further infection, as was demonstrated by transference to an orang-outang. Prowazek insists that it is always the epithelial cells and never the lymphoid cells of the true follicles that are involved.

CARBONE (533, **Trachoma and rhinitis**) remarks the frequent coincidence of alterations in the nasal mucous membrane and trachoma. He recalls also the communication of Basso, to the eighteenth congress of Italian ophthalmologists, concerning conjunctivitis and pharyngitis granulosa, according to which 80% of the persons suffering from trachoma or follicular conjunctivitis have also affections of the throat. He reports 78 cases of granular conjunctivitis observed between January and December, 1906, in all of which he found by macroscopic examination changes in the nasal mucous membrane varying from simple hyperæmia to hypertrophy, from simple atrophy to ozæna. Although it is not certain that the nasal affection precedes the eye affection, yet it is very probable, because it is acknowledged that infection is communicated from the pituitary membrane to the conjunctiva, but not inversely. According to the author, the principal means for transmission of the virus is the air of the room in which the patients are, because it is mixed with the dust suspended in the air. During respiration the virus is thus brought upon the Schneiderian membrane, and its evolution is favored by colds, which alter the bactericide properties of the nasal secretion, and by the atmospheric dust itself. When the conjunctiva and pharynx are involved at the same time, we must necessarily assume that the Schneiderian membrane is affected because it forms the connection between them. Treatment of the nasal and pharyngeal mucous membranes should be associated with the treatment of the eye. CALDERARO.

BURZEW (534, **Casuistics of subconjunctival tumors**) reports a case of subconjunctival lipoma of the right eye that had been present since childhood, in the region of the lower lobe of the lachrymal gland, about the size of a small bean and adherent anteriorly to the conjunctiva. He also reports the case of a subconjunctival sarcoma as large as a pea in the middle of the upper transition fold in a woman fifty-three years old. It was a recurrence of a similar growth in the same place that had been excised two years before. Shortly before the patient had had a tumor removed from the right parotid gland which had proved to be a spindle-celled sarcoma with admixture of pigment. In the subconjunctival tumor extirpated in a firm capsule the author likewise found a small quantity of pigment granules. Burzew would consider the tumors in the parotid as simultaneous with the subconjunctival, or as secondary, but not as primary.

HIRSCHMANN.

XII.—CORNEA AND SCLERA.

535. GOLDBERG, HUGO. **Pigment granules on the inner surface of the cornea.** *Archiv f. Augenheilkunde*, lviii., No. 4, p. 324.

536. SEEFELDER, R. **Peripheral formation of furrows and peripheral ectasia of the cornea.** *Klin. Monatsbl. f. Augenheilk*, xlv., No. 2, p. 573.

537. AXENFELD, TH. **Chronic peripheral formation of furrows in the cornea.** *Ibid.*, p. 578.

538. HOLMES-SPICER, W. T. **Vesicular affections of the cornea** *Ophthalmic Review*, Nov., 1907.

539. BUCHANAN, L. **On two cases of family degeneration of the cornea.** *Ophthalmoscope*, Dec., 1907.

540. BOURGEOIS, A. **Injuries of the eye by particles of glass from champagne bottles.** *Archives d'ophtalmologie*, xxvii., p. 758.

541. PALTRACCA, E. **Fuchs's keratitis disciformis.** *Annali di ottalmologia*, 1907, fasc. 6, 7, 8.

542. SELENKOWSKY, J. W. **Pathogenesis of keratitis neuroparalytica. A case of unilateral neuroparalytic keratitis with coincident ophthalmoplegia (ptosis) and optic atrophy. Microscopical examination of the eye.** *Russk. Wratsch*, 1907, No. 30.

543. STADFELDT, A. **A peculiar case of keratitis in a patient with gonorrhœa.** *Thirtieth Meeting of the Ophthalmological Society of Copenhagen.* Reference in *Hospitalstid*, 1907, p. 1178.

544. HESSE, R. **Technique of tattooing the cornea.** *Klin. Monatsbl. f. Augenheilkunde*, xlv., No. 2, p. 517.

545. SALZMANN. **Pathological anatomy and pathology of keratoconus.** *Archiv f. Ophthalmologie*, lxvii., No. 1, p. 1.

546. Monthus and Descomps. **Tuberculous tumor of the sclera.** *Soc. d'ophtalmologie de Paris*, Nov. 5, 1907.

547. Wernicke. **Cysts of the sclera.** *Arch. f. Augenheilkunde*, lix., No. 1, p. 23.

548. Smith, E. T. **Notes of a case of episcleritis periodica fugax.** *Ophthalmic Review*, October, 1907.

Goldberg (535, **Pigment granules on the inner surface of the cornea**) finds with the corneal microscope pigment granules on the posterior surface of the cornea of uninflamed eyes with increasing frequency after the thirtieth year of life, in a total of 33% of all eyes, especially in eyes with clear iris and with cataract. The granules are about 9 micromillimetres large, few in number, and sometimes in motion, always of the color of the iris.

Speaking of a new case of peripheral formation of furrows and ectasia of the cornea in an eye that had never been inflamed, Seefelder (536, **Peripheral formation of furrows and peripheral ectasia of the cornea**) says that we have to deal here with a typical form of a disease based on a peculiar process of degeneration of the ground substance of the cornea. Covering with a flap of conjunctiva is considered therapeutically.

Axenfeld (537, **Chronic peripheral formation of furrows in the cornea**) has seen the transition of one case into typical ulcus rodens, and in another case the healing after a cataract operation was complicated by the furrow so that the margins of the corneal wound became necrotic.

Holmes-Spicer (538, **Vesicular affections of the cornea**) first points out how delicate and exposed is the corneal epithelium. It is loosely attached to the Bowman's membrane. It consists of five or six layers, each one of which is easily separated from that below. This ease of detachment is an important point in the development of vesicular affections. Reptiles cast their corneal epithelium when they shed their skins; perhaps the periodic detachment in bulbous keratitis is a tissue memory of the process. The epithelium may become separated in acute conjunctivitis, in panophthalmitis. in keratomalacia, or neuroparalytic keratitis. The action of cocain affords another example of the case of detachment, Nervous influence has much to do with the production of vesicular affections of the cornea.

Herpes zoster of the fifth nerve is due to inflammation of the Gasserian ganglion which causes anæsthesia of the cornea with consequent ulceration. There is in addition a centripetal irritative influence which, even when the cornea is protected, may lead to deep keratitis, cyclitis, and hypotony. Probably the small ulcers which form in herpes are caused by trophic changes; they are very resistant to treatment and heal with difficulty.

Febrile herpes of the cornea is characterized by a sudden onset with pain and irritation of the eye. A roughness appears above parts of the cornea caused by a group of vesicles which follow a long sinuous line, as though following a nerve; or they may form a group of eight or ten dots.

Filamentary keratitis is caused by the lids rolling the epithelium cells into filaments which hang from the cornea.

Dendritic ulcers are seen in two forms. One starts from a broad base at the limbus, and runs a sinuous, ever-narrowing course across the cornea, throwing out buds and branches on each side. The other type is the *stellate ulcer* of Fuchs. In each there is partial anæsthesia. They should be treated with carbolic acid. If this be not enough, absolute alcohol should be used, but it causes great pain afterwards. In obstinate cases the whole surface must be rubbed with a roll of fine lint soaked in alcohol.

Herpes ophthalmicus. In a certain portion of cases vesicles appear on the cornea. Generally speaking, when the tip of the nose is affected the cornea suffers.

Relapsing bulbous keratitis follows an injury. A slight abrasion heals after a few days with simple treatment. After an interval varying from a few weeks to as many years, there is an exact reproduction of the effects of the original injury. A bleb forms and the epithelium is cast off. There are often several repetitions of this process. In some cases there is no history of a primary injury; 78% of the cases occur in females.

Superficial punctate keratitis is a form of general catarrh of the conjunctiva; gray elevations cover the conjunctiva and the cornea. The disease is rather an infection than a herpes.

Bullæ forming in deep corneal affections are of the nature of epithelial œdema. They are found in the different forms

of interstitial keratitis, in keratitis profunda, and keratitis disciformis.

This paper, written by one who has made a profound study of corneal affections, should be read in the original.

T. HARRISON BUTLER.

BUCHANAN (539, **On two cases of family degeneration of the cornea**) furnishes two more cases of this disease.

A. M., age thirty-four, began to lose sight at nineteen; no inflammatory attack. This slowly progressed.

The central part of the cornea is occupied by small gray spots of opacity; the spots at the centre are so close that no clear tissue remains. V = hand reflex. The periphery was clear, so an iridectomy was done downwards on each side. This improved the vision to counting fingers at 10 feet.

W. M., brother of the former patient, age thirty-six. The corneal condition resembled the brother's. Iridectomy resulted in sufficient improvement for him to return to work. V = $\frac{15}{200}$.

Later some haze formed in the clear peripheral area, but this cleared up under dionin and eserin.

Two sisters were similarly affected.

The disease was a form of the "nodular" type of family degeneration of the cornea. The condition commenced after puberty. T. HARRISON BUTLER.

BOURGEOIS (540, **Injuries of the eye by particles of glass from champagne bottles**) reports 26 cases of injury to the eye, including scleral and corneal ruptures, by fragments of glass from champagne bottles, of which six are given in detail. In ruptures of the sclera and cornea he recommends the use of catgut sutures. BERGER.

PALTRACCA (541, **Fuchs's keratitis disciformis**) concludes from his clinical observation that Fuchs's keratitis disciformis commences with an iridocyclitis, which indicates an endogenous origin of this affection, and that the use of injections of sublimate of mercury, can shorten the course of the disease.

CALDERARO.

SELENKOWSKY'S (542, **Pathogenesis of keratitis neuroparalytica**) microscopic examination of an eye with neuroparalytic keratitis, protected from traumatism and drying

by complete ptosis, revealed the following: 1. Ulcerative keratitis with destruction of the epithelium and of the larger part of the cornea, necrosis of the superficial layers of the substantia propria corneæ, and reactive inflammation and vascularization of the middle layers. 2. Slight secondary fibrino-cellular iritis, reactive hyperæmia of the ciliary body and of the choroid, with exudation of fibrin from the latter. 3. An interstitial process in the optic nerve and papilla, with secondary degeneration of the nerve fibres and of a part of the ganglion cells of the retina entirely independent of the disease in the anterior section of the eye. 4. Bacilli and cocci present in the most superficial necrosed lamellæ of the cornea. The case described is best explained by the purely trophic theory. HIRSCHMANN.

STADFELDT'S (543, **A peculiar case of keratitis in a patient with gonorrhœa**) patient presented a slight conjunctivitis with parenchymatous changes in the cornea five or six weeks after an attack of gonorrhœa. He had never had syphilis. The keratitis healed rapidly so that in the course of three weeks the cornea was covered with shining epithelium. There were slight superficial spots and traces of deep-lying vessels. HELLGREN.

HESSE (544, **Technique of tattooing the cornea**) has modified the operation of tattooing in which a central flap is removed in order to stain its bed black by leaving the flap attached at one corner in order that it may become re-attached smoothly over the tattooed field. Accidentally he was enabled to convince himself microscopically of the re-attachment of the flap.

SALZMANN (545, **Pathological anatomy and pathology of keratoconus**) examined the eye of a young, weak-eyed epileptic that had keratoconus, posterior staphyloma, and other anomalies of formation or development. The conus and staphyloma appeared to be common polar ectasia that had developed, without preceding disease in the previously normal eye, from a fault of development of the centre of the cornea, which remained backward in firmness or strength when the rest of the body approached its full growth.

MONTHUS and DESCOMPS (546, **Tuberlcuous tumor of**

the sclera) report a patient twenty-two years old from whom de Lapersonne had extirpated a tuberculous tumor of the sclera and cauterized the surface of the wound with the galvano-cautery four years before. The eye remained preserved, but the patient had since developed a paraplegia in consequence of tuberculosis of the vertebræ. BERGER.

WERNICKE (547, **Cysts of the sclera**) discovered by operation a cyst near the cornea which was not episcleral, but scleral. It appeared to be a diverticulum of the anterior chamber formed by the aqueous along a vessel penetrating the sclera. The inner layer of the sclera sustained the pressure and bulged outward. The cyst had slowly grown to the size of a bean. It could not be removed because of danger to the cornea.

SMITH (548, **Notes on a case of episcleritis periodica fugax**) has had the opportunity in Queensland of treating a case of this rare condition. Fuchs alone gives a lucid account of the disease, and the description fits the writer's case. The attack commences with slight haze of the sight of one eye accompanied by slight myosis. A day or two later a few scleral vessels become engorged, and a salmon-colored blush appears at one spot which is tender. Next day the eye becomes painful and there is a neuralgia of the side of the head. The pain comes on in paroxysms and is very severe. The eyeball at the affected spot is now exquisitely tender. The affected area gets more and more engorged till it looks like raw beef. There is no swelling or node and no chemosis. After about a week the condition begins to subside.

The condition of the eye is well illustrated by three most instructive paintings which accompany the article. The inflammatory state occupies one quarter to one third of the sclera, on one occasion it covered half the visible sclera.

The author has seen five attacks in this patient; the second came on three months after the first, the third four months later. The average duration of confinement to the house was sixteen days; the period of disability, seven to twenty-eight days. At the worst stage the patient had to be kept in a dark room, with the eye covered in with wool and tied up

with a *black* silk handkerchief, as the least vestige of light caused pain. Eye movements caused no additional pain, proving that Tenon's capsule was not implicated. The pain was best allayed by hot applications. Local treatment was unsatisfactory, but Smith seems not to have tried dionin which has a very useful analgesic action, nor adrenalin which certainly relieves many cases of scleritis.

Morphia was not tolerated, salicylate of soda, antipyrin, salicin, salophen, and the alkalies were useless. Quinin, on the contrary, seemed to cut short the attacks and on several occasions a full dose aborted the attack. The patient also lost toxæmic headaches which had been violent for some time when he took a daily dose of 15 grains of salicylate of quinin. The patient had suffered from an infective urethritis with metastatic joint affection. He had had a severe iritis and cystitis. No sign of a past iritis could be seen. The urethritis appeared on several occasions; after one attack he had a general arthritis in which almost all the large joints participated. He is almost an abstainer from alcohol. Patient's temperature is often 100° in the afternoon.

Smith considers that the patient was suffering from a general toxæmia due to the gonococcus. He does not mention whether or no malarial infection was present. Malaria is frequent in Queensland, but this patient's blood showed a leucocytosis, whereas in malaria, at any rate during the febrile period, a leucopœnia is the rule. The writer's conclusions are:

1. The disease may exist in a severe form without any exudate of serum or round cells into the sclera.

2. A period of depressed general health precedes the attack.

3. The affection may be para-gonorrhœal in origin.

4. Locally warmth and protection are always necessary; drugs which act upon the pupil are, as a rule, unnecessary and probably harmful.

5. The disease is not a fleeting form of episcleritis but a distinct affection whose not least prominent characteristic is that the eye is left after the attack in an apparently normal condition both as regards structure and function.

T. HARRISON BUTLER.

Sections XIII.-XVIII. Reviewed by DR. NICOLAI, Berlin.

XIII.—LENS.

549. KRAEMER, R. **Phakocele.** *Arch. f. Ophth.*, lxvii., p. 41.

550. v. PFLUGK. **The influence of potassic iodide upon incipient cataract.** *Arch. f. Ophthalmologie*, lxvii., pp. 272 and 537.

551. GRAUER. **The injurious influence of anilin-colored solutions of sublimate upon the cornea in cataract operations.** *Third Meeting of the Northern Ophthalmologists in Christiania*, 1907.

552. JACKSON, E. **The effect of pressure on the healing of the corneal incision after cataract extraction.** *Ophthalmic Review*, Nov., 1907.

553. ULBRICH, H. **Senile cataract with secondary glaucoma.** *Zeitsch. f. Augenheilkunde*, xviii., No. 2, p. 133.

KRAEMER (549, **Phakocele**) divides these cases into two classes, those following ulcerative keratitis and those following traumatism. The first group is the larger, because not so rarely the lens is pressed forward hernia-like by increased intraocular tension. He describes a case of traumatic phakocele in a woman sixty-one years of age who had received an injury to her left eye, by means of which the lens was luxated and the nucleus had closed the wound as if it were a tampon. Increase of intraocular tension finally drove a portion of the lens through the opening.

v. PFLUGK (550, **The influence of potassic iodide upon incipient cataract**) has tested the influence of potassic iodide upon opacities of the lens. In the anatomical portion of the work he finds that small doses exert a protective influence upon the epithelium of the lens, but that larger doses are injurious in their effects. In the clinical portion he shows that an improvement of vision can be obtained by the use of iodin in the naphthalin cataracts of rabbits and of preparations of potassic iodide in cases of senile cataract by the influence exerted upon the epithelium of the lens. Out of 239 eyes thus treated a large number showed a remarkable improvement. He says that the best method is the subconjunctival injection with addition of acoin and subsequent instillations of acoin oil. The therapy seems rational and can be generally recommended.

GRAUER (551, **The injurious influence of anilin-colored solutions of sublimate upon the cornea in cataract operations**)

thinks that the anilin coloring matter in sublimate solutions can cause an opacity of the cornea if used during cataract operations.

JACKSON (552, **The effect of pressure on the healing of the corneal incision after cataract extraction**) draws attention to the evil effect of pressure on an eye after cataract extraction in causing the flaps to override each other. He does not believe that the cornea has any tendency to alter its shape by virtue of its inherent elasticity. He knows of no behavior of the cornea at the time of operation that seems to indicate a "freeing of the corneal lamellæ from their state of normal tension and allowing the corneal flap to spring forward." At the close of a normal extraction no change of shape can be demonstrated by Placido's disk. If an excess of cocain has been used the flap may even tend to collapse. The conclusion is that *all pressure upon the eyeball should be carefully avoided after cataract extraction.* T. HARRISON BUTLER.

ULBRICH (553, **Senile cataract with secondary glaucoma**) reports three cases of secondary glaucoma due to senile cataract. He divides the cases in which senile cataract and glaucoma are associated into three classes: (1) those in which cataract appears in an eye blinded by glaucoma on account of defective nutrition of the lens; (2) those in which an eye with senile cataract is attacked by glaucoma, or the reverse, without any etiological relation; and (3) those in which the cataractous lens is the cause of the glaucoma by its swelling. Treatment consists of iridectomy and extraction of the lens, best performed in two operations in order to avoid the danger of intraocular hemorrhage.

XIV.—IRIS.

554. KUEMMELL, R. **Genesis of epithelial cysts within the eye, especially of the iris.** *Klin. Monatsblaetter f. Augenheilkunde*, xlv., No. 2, p. 421.

555. YAMAGUCHI, H. **Coloboma of the iris upward and inward.** *Klin. Monatsblaetter f. Augenheilkunde*, xlv., No. 2, p. 590.

556. BUCHANAN, L. **Rupture of the pectinate ligament.** *Ophthalmoscope*, Nov., 1907.

557. LUBOWSKI, E. **Clinical contribution to the study of tuberculous uveitis.** *Klin. Monatsblaetter f. Augenheilkunde*, xlv., No. 2, p. 539.

558. Sgrosso, E. **Spontaneous cure of tuberculous iritis. Its prognosis.** *Archivio di ottalmologia*, 1907.

Kuemmell (554, **Genesis of epithelial cysts within the eye, especially of the iris**) examined microscopically an eye with a cicatricial staphyloma that followed a perforating ulcus serpens, enucleated from a patient sixty years of age because of increase of tension, and could follow the advancing proliferation of epithelium in the eye with formation of a cyst of the iris. The condition was confirmatory of Stoelting's theory, according to which the epithelium overran the divided capsule and helped to form the cyst, while subsequently the cavity became closed at the corneal end. The wound, which remained open a long time in this case, was covered over with epithelium; the wound canal was invaginated, and a vesicle was formed. A complete occlusion with a true cyst was not present because of the width of the canal.

Yamaguchi (555, **Coloboma of the iris upward and inward**) describes an atypical coloboma of the iris upward and inward and considers it to be a fault of development, although the faults in the closure of the fœtal eye-cleft below are more frequent. The genesis of the atypical coloboma is uncertain, but the theory of fœtal inflammation appears to be generally refuted.

Buchanan, L. (556, **Rupture of the pectinate ligament**), supplies an article, illustrated by micro-photographs, referring to *rupture of the pectinate ligament*. The number of cases is small, but probably the injury is more frequent than the records indicate.

The ligamentum pectinatum iridis is the true tendon of the ciliary muscle. It extends radially forwards from the ciliary muscle to be inserted at the periphery of the cornea. The spaces between its fibres are the "spaces of Fontana," and it forms the posterior wall of the canal of Schlemm. The external surface of the ciliary body has but slight connection with the inner surface of the sclera, and during accommodation the ciliary body slides upon the sclera. If the ligament be ruptured, throwing the canal of Schlemm directly into the anterior chamber, there is nothing to keep the ciliary body in position. Rupture of the ligamentum pectinatum, then, implies displacement of the ciliary body. The ligament re-

inforces the sclera at its weakest part; rupture of the sclera is accompanied by partial rupture of the ligament.

The rupture is generally the result of a blow with a blunt object which indents the eyeball. The effect is that the ciliary body slips back along the sclera, and if the rupture be extensive it may fall back into the vitreous chamber. The canal of Schlemm ultimately becomes obliterated and conduces to the production of secondary glaucoma. The ciliary body unless displaced into the vitreous becomes attached to the sclera by fibrous tissue. The lens is usually dislocated.

The clinical appearances vary according to the extent of the injury. Immediately after the injury the anterior chamber is generally full of blood, which completely masks the characteristic signs. Later on when the hyphæma has become absorbed the anterior chamber is seen to be of uneven depth and the pupil is no longer circular.

If the rupture be of small extent the pupil will be displaced to one side whilst the pupillary margin is *visible all round.* With an extensive rupture we get different appearances. The iris may be torn from the ciliary body, or the iris may be carried back with the ciliary body; then the chamber will be very deep at the spot where the rupture has occurred. There may be extensive mydriasis at a very early stage.

There is generally much pain and increased tension.

The prognosis is bad, the tension remains high, and eventually the eye shrinks if not previously excised.

T. Harrison Butler.

Lubowski (557, **Clinical contribution to the study of tuberculous uveitis**) relates two clinical histories which indicate the importance of tuberculosis as an etiological factor in uveitis. Beyond doubt the process is localized by preference in the uvea, and the vascular chorioid is well suited for the formation of tuberculous foci. Often the foci cannot be seen in the peripheral part of the chorioid; sometimes they are absent and the process is then localized wholly in the sclera. In both cases tuberculin was injected and the nature of the disease proved characteristic. In any case, even when no nodules can be found in the iris or in the pectinate ligament,

a deeper-lying focus should be thought of and treatment directed accordingly. It appears as if these processes that begin in the chorioid or ciliary body have a greater tendency to involve the deep layers of the cornea than those that begin in the sclera. Injections of tuberculin, both as a test and for treatment, seem to the author to be of great importance and very useful in these cases.

Sgrosso (558, **Spontaneous cure of tuberculous iritis**) reports a clinical case of so-called benign tuberculosis of the iris met with in a boy six years old, which recovered spontaneously, leaving behind atrophy of the tissue in place of the reabsorbed tuberculous nodules, atrophy of the remaining parts of the iris, false cataract, and a slight atrophy of the globe. Little fragments of the substance extracted from the anterior chamber he inoculated into the anterior chambers of both eyes of a rabbit. This experiment not only confirmed the diagnosis of tuberculosis, but also showed that the inoculation of cheesy masses taken from the eye of the patient was followed, first, by resorption, and then by a new formation of tubercles in the iris and the ciliary body and a virulent development, in contrast to the course of the tuberculous iritis in the boy from whom it had been taken. Three months after the enucleation of its eye the rabbit was killed and its organs examined, but in no other organ could the existence of tuberculosis be detected. He concludes with the statement that the prognosis of an exhausted tuberculosis of the iris may be not so favorable as it appears at the first glance, because Koch's bacilli may have entered other organs or tissues even when the intraocular tuberculous focus appears clinically healed. Calderaro.

XV.—CHORIOID.

559. Behse, E. **The anatomical construction of the conus and the changes in the chorioid in the myopic eye.** *Arch. f. Ophth.*, lxvii., p. 379.

560. Bertozzi, A. **Congenital changes of the chorioid, ciliary region, and iris.** *Annali di ottalmologia*, 1907, fasc. 6, 7, 8, pp. 391–550.

561. Velhagen, C. H. **A case of partial tearing away of the retina from the papilla in detachment of the retina due to sarcoma of the chorioid.** *Klin. Monatsblaetter f. Augenheilkunde*, xlv., No. 2, p. 427.

BEHSE (559, **The anatomical construction of the conus and the changes in the chorioid in the myopic eye**) comes to the following conclusions: 1. The conus is produced by circumscribed atrophy of the chorioid and of the pigment epithelium due to a stretching of the chorioid in this region. 2. The atrophic patches, both chorioidal and retinal, in the myopic eye are connected with stretching of the capsule through the reduced resistance of the sclera. The chorioidal patches may occur with or without lacerations of the elastic lamina. The chorioidal and retinal patches can scarcely be clearly distinguished apart ophthalmoscopically because the pigmentations are very similar. Besides, the chorioid presents white spots with pigmented margins, or bright white patches with indistinct margins.

BERTOZZI (560, **Congenital changes of the chorioid, ciliary region, and iris**) remarks that the number of reported cases of congenital changes in the chorioid, ciliary region, and iris is quite large, and that we have detailed clinical and histological descriptions of almost all these manifold anomalies. Still little is known of their etiology. He inclines to the theory that these changes are of inflammatory origin, in favor of which he quotes some cases in which there were indubitable traces of inflammation during intra-uterine life. But there was no uniformity as to the nature of the inflammatory process. He summarizes the results of his study as follows: 1. In the present state of our knowledge it is impossible to ascribe the congenital changes in the chorioid, ciliary region, and iris to a single pathogenesis. 2. The occurrence of an inflammatory process acting upon the eye during its development seems to furnish the most logical and best explanation of these congenital changes. 3. Even when a certain importance is ascribed to heredity in the etiology of the congenital alterations in question, this is usually in connection with an infectious disease of the parents. 4. New studies and researches are necessary to clear up the subject. CALDERARO.

VELHAGEN (561, **A case of partial tearing away of the retina from the papilla in detachment of the retina due to sarcoma of the chorioid**) enucleated an eye containing a sarcoma of the chorioid and examined it microscopically.

The detachment of the retina was produced by an exudate between the two membranes, so that in this case the cause was the *vis a tergo* and not the tension of the shrunken vitreous. At the same time he found a tearing away of the retina, something which has been seldom observed. It must be assumed that at first little adhesions were formed between the chorioid and retina, which were loosened only in part by the rapidly accumulating exudate and in some places caused lacerations. This case is worthy of note in the consideration of the theory of the origin of a detachment of the retina.

XVI.—VITREOUS.

562. CALDERARO. **Suppurative metastatic panophthalmitis from staphylococcus pyogenes albus. Bacteriological and experimental study.** *La Clinica oculistica*, Oct., 1907.

563. BOCCHI. **Extraction of a cysticercus from the vitreous.** *Report of the Nineteenth Congress of the Italian Ophthalmol. Soc.*, October, 1907.

CALDERARO (562, **Suppurative metastatic panophthalmitis from staphylococcus pyogenes albus. Bacteriological and experimental study**) reports a case of metastatic purulent panophthalmitis from a furuncle at the root of the nose between the eyebrows. The bacteriological examination of the blood taken from the tip of the finger and from the orbit during the enucleation was negative. On the contrary, numerous staphylococci were present in dry preparations of the contents of the eye and of the pus from the furuncle. Cultures from the same material showed pure cultures of the staphylococcus pyogenes albus. The inoculation of rabbits produced panophthalmitis after three days.

This is the first time that metastatic panophthalmitis has been reported as due to the staphylococcus pyogenes albus; it has usually been due to the aureus and in a few cases to the citreus.

The histologic examination revealed a purulent retinitis and chorioiditis, the former more marked than the latter. Aside from this the intraocular infection followed a course that was not violent, probably because of the lesser degree of virulence of the staphylococcus pyogenes albus found in the pure culture. CALDERARO.

BOCCHI (563, **Extraction of a cysticercus from the vitreous**) first withdrew the vitreous with a syringe, then extracted the cysticercus, sutured the wound, and finally re-injected the vitreous.

XVII.—GLAUCOMA.

564. BULSON, A. E., Jr. **Glaucoma after cataract extraction with iridectomy.** *Ophthalmic Record*, Nov., 1907.

565. BLESSIG, E. F. **Etiology and general treatment of the so-called inflammatory glaucoma.** *Westn. Ophthalm.*, 1907, No. 6.

566. TERSON, A. **Pathogeny of glaucoma.** *Société belge d'ophtalmol.*, Meeting Nov. 24, 1907.

567. ROLLET. **Drainage of the anterior chamber with a thread to prevent increase of tension and pain.** *Revue générale d'ophtalmol.*, xxvi., p. 289.

568. QUERENGHI. **Results of sclero-choriotomy in the treatment of glaucoma.** *Nineteenth Congress of the Italian Ophthalmological Society*, Parma, Oct. 1, 1907.

569. BJERRUM, J. **A contribution to the treatment of glaucoma.** *Third Meeting of the Northern Ophthalmologists in Christiania*, 1907.

570. HENDERSON, T. **On so-called filtering cicatrices in the treatment of glaucoma.** *Ophthalmoscope*, Dec., 1907.

BULSON (564, **Glaucoma after cataract extraction with iridectomy**) does not believe that high pressure in these cases is due to entanglement of the iris or of the capsule in the scar, as commonly supposed, but rather to alteration of the constitution of the aqueous, which by its increased density blocks up the outlet. He relates two cases of extraction which did well for a number of weeks and then as the result of secondary glaucoma came to enucleation. ALLING.

BLESSIG (565, **Etiology and general treatment of the so-called inflammatory glaucoma**) asserts that every glaucomatous attack presents the character of a severe acute or chronic disturbance of the intraocular circulation, that the pathological changes found are to be explained as the causes and not as the consequence of the glaucomatous symptoms, and that it forms only a local symptom of the general disease or disturbance of innervation of the vascular system of the organism. Gout and syphilis, which predispose to glaucoma, exercise their influence through changes in the vascular system. When either of these diseases is present a specific treatment is necessary. The syphilitic basis in glaucoma

shows itself not rarely in the combination of glaucoma, deafness, and a saddle-shaped nose, a characteristic triad. The author does not undervalue myotics and admits that in certain cases operative treatment is contra-indicated, but insists on the performance of an iridectomy in the earliest possible stage of an inflammatory glaucoma. The operation is certainly the most immediately necessary, but it may be an error to rely upon it alone. Medical treatment should be given not to the glaucomatous eye alone, but to the entire man who is suffering from this disease. Better results may then be obtained. HIRSCHMANN.

After an introduction in which TERSON (566, **Pathogeny of glaucoma**) considers glaucoma as a symptom complex, an œdema in different relations, so that it cannot be properly spoken of as a disease ***sui generis***, he mentions the causes, heredity, sex, the predisposition of the Jewish race, the tendency of gout and rheumatism to its production, the occasional influence of syphilis, weakened conditions of the nervous system, and especially the influence of irritant pathological conditions, such as cutaneous eruptions, asthma, emphysema, dyspepsia, diseases of the kidneys and of the heart, and arteriosclerosis. Hypermetropia is also frequently the basis of a glaucoma. Then he mentions occasional causes, such as the influence of the weather, diseases and straining of the eyes, and general diseases, including concussions of the nervous system. Buphthalmia with its congenital origins is also mentioned. The relations of the blood pressure to glaucoma, particularly in the chronic and hemorrhagic forms, are then considered. Sometimes arteriosclerosis and functional disturbances of the kidneys are present as complications. The influence of the lowered blood pressure upon the intraocular tension is also spoken of. It must be borne in mind that the blood pressure, whether raised or lowered, is only one of the factors that take part in the pathogenesis of glaucoma together with many others. The question what part the change of fluid in the eye plays needs thorough investigation, for, as Cantonnet says, the rules of osmosis cannot alone explain the origin of glaucoma, but many factors of general nature are involved. Histological examinations cannot reveal the condition in the fresh stage,

or in the chorioid and ciliary body; it is often impossible to determine correctly organic changes because the pathological conditions are fleeting and transient, like congestions. Therapeutically he praises dionin, less so adrenalin. Cold applications are borne better than warm. Surgical interventions begin with paracentesis in its manifold variations and include the action of iridectomy with a filtration cicatrix. Ophthalmomalacia is the opposite condition to glaucoma and it is probable that the two are related through a similar cause. Finally the author describes the various forms of glaucoma, primary, acute and chronic, and secondary. Experimental work in glaucoma has explained much, particularly with regard to the mutual relations of general and ocular diseases. They are of importance in the pathogenesis of glaucoma because cause and effect can be recognized through very careful control in all stages.

ROLLET (567, **Drainage of the anterior chamber with a thread to prevent increase of tension and pain**) reports a case of subacute and acute glaucoma in which he secured drainage of the anterior chamber and so prevented pain and an increase of tension by the introduction of a thread. A transient hypotony (T–2) was obtained. BERGER.

QUERENGHI (568, **Results of sclero-choriotomy in the treatment of glaucoma**) performs a paracentesis of the posterior chamber in order to favor the circulation in the perichorioidal space. Out of 43 patients 40 were cured, a very remarkable result. Eserin and other means to reduce tension were also employed. BERGER.

BJERRUM (569, **A contribution to the treatment of glaucoma**) since 1905 has made the puncture by preference 4 to 8*mm* peripherally from the cornea repeatedly in sclerotomy for glaucoma. The result was good in 10 out of 14 eyes with simple glaucoma. Myotics were used in most cases after the operation. Of 10 eyes with buphthalmos in children 8 retained their vision and had normal tension. Prolapse into the puncture occurred in three cases. HELLGREN.

HENDERSON (570, **On so-called filtering cicatrices in the treatment of glaucoma**) discusses the operations of Lagrange and Herbert who claim to relieve glaucoma by producing

"*filtering cicatrices.*" Professor Lagrange snips off a piece of the corneal flap with scissors, and so makes a more or less wide gap; Herbert cuts off a similar piece subconjunctivally, and leaves it *in situ* as a corneal graft. Incisions in the limbus heal; *first* by mediate union of the conjunctival flap which prevents the usual downgrowth of surface epithelium; *finally* by a downgrowth of vascular subconjunctival tissue into the wound. At this stage the wound is a "filtering area," but not for long, for the posterior corneal endothelium grows in and seals the wounds. Henderson has examined aphakic and iridectomized eyes, and in all cases the cicatrix was firm and *lined by endothelium*, thus precluding all possibility of "*filtration.*" The author states that the success of the operation does not lie in the filtering wound but in the accompanying iridectomy. The reason according to him for the curative effect of von Graefe's iridectomy lies in the fact that the cut iris never undergoes any reparative process but always remains a raw, open wound, as when first cut, acting as a permanent filtering area through which the aqueous can drain away. The efficacy of this drainage area depends upon the operation being done before atrophy of the iris stroma has progressed too far. See the *Ophthalmic Review*, July, 1907.

In the following number of the *Ophthalmoscope* Herbert writes a letter in which he states that he has in India at the time several patients with *obvious* "filtering cicatrices," the result of his operation. T. HARRISON BUTLER.

XVIII.—SYMPATHETIC OPHTHALMIA.

571. LENZ. **Anatomical studies of both eyes in a case of sympathetic ophthalmia.** 79 *Vers. deutscher Naturforscher und Aerzte*, Dresden, Sept. 18, 1907.

It is rarely that opportunity offers for the examination of a sympathetic and of the sympathy producing eye. LENZ (571, **Anatomical studies of both eyes in a case of sympathetic ophthalmia**) describes the histological examination of such a case. With regard to the infiltration, which was common to both eyes in the same degree, at first the cells come from the blood current, in small part from the lymph current, and wander out; later there is a formation of lymphocytes

in the tissue, arising probably from Marchand's adventitia cells, the so-called leucocytoid cells. In the retina of the sympathetically inflamed eye there were occlusions of vessels and capillaries produced by lymphocytes, leucocytes, and loosened endothelium. About the vessels was a mantle of round cells. The veins contained, centrally rather than peripherally, thrombotic masses which narrowed the lumen. Hence in this patient, who did not suffer from arteriosclerosis, the process was an embolic one, the origin of which must be sought in the other eye. This view would lead to the theory of a metastatic origin of sympathetic ophthalmia. The disease starts in the posterior segment of the globe, in the chorioid, and later attacks the uvea in the anterior portion of the eye.

Sections XIX.–XXII. Reviewed by Dr. H. MEYER, Brandenburg.

XIX.—RETINA AND FUNCTIONAL DISTURBANCES.

572. CABANNES. **The relations of pigmentary retinitis to hereditary retrobulbar optic neuritis.** *Arch. d'ophtal.*, xxvii., p. 642.

573. PINCUS, F. **Complete restoration of function after apoplexia sanguinea retinæ (thrombosis venæ centralis).** *Klin. Monatsbl. f. Augenheilkunde*, xlvii., p. 568.

CABANNES (572, **The relations of pigmentary retinitis to hereditary retrobulbar optic neuritis**) observed in three brothers the onset of visual disturbances between the ages of five and fourteen. In the first case there was retinitis pigmentosa with optic neuritis and central scotoma. In the second and third cases there was a neuro-papillitis that resulted in optic atrophy. The sister of the three patients had normal eyes. The author concludes from these cases that there is a close relation between retinitis pigmentosa and hereditary retrobulbar neuritis. The latter can be caused by a chronic basal meningitis which may be recognized from the onset of severe headache, vomiting, and the simultaneous disturbances of vision. BERGER.

PINCUS (573, **Complete restoration of function after apoplexia sanguinea retinæ**) observed large retinal hemorrhages from thrombosis of the central vein in a patient forty-six

years old on August 21, 1905. These disappeared under treatment so that on April 25, 1906 the vision was ⅓ and all disturbances had disappeared except for a certain overfilling of the veins. In May, 1906, the vision was normal and the fundus normal except for a little tortuosity of the retinal veins. Pincus ascribes this extremely fortunate result to a canalization of the thrombus. The theory of a compression in the sheath of the optic nerve is rejected.

XX.—OPTIC NERVE.

574. ZADE. **Two peculiar cases of congenital anomaly of the entrance of the optic nerve.** *Klin. Monatsbl. f. Augenheilkunde*, xlv., No. 2, p. 435.

575. HANDWERCK, C. **Transient œdema of the optic papilla, a localization of circumscribed œdema.** *Muenchener med. Wochenschrift*, 1907, p. 2332.

576. WILLIAMSON, L. **Homonymous quadrant anopsia.** *Amer. Jour. of Ophthalmology*, Dec., 1907.

577. STIEREN, EDW. **Surgical interference in choked disc.** *Ophthal. Record*, March, 1908.

ZADE (574, **Two peculiar cases of congenital anomaly of the entrance of the optic nerve**) depicts a case of bilateral coloboma of the optic nerve. In the left eye there was a deep funnel-shaped excavation of the papilla with gray discoloration and full normal vision. The coloboma therefore could not be larger than the normal papilla. The second case showed a circumpapillary excavation of the posterior segment of the globe. In the midst of the papilla was a white spot which corresponded to a myopia of 15 D. The red tissue surrounding this white showed a myopia of from 8 to 10 D. The vessels ran over the margin of the crater without bending at too sharp an angle. Quite peripherally there was a bright ring formed from numerous fine spots. A satisfactory ophthalmoscopic explanation of this picture is not given.

HANDWERCK'S (575, **Transient œdema of the optic papilla, a localization of circumscribed œdema**) case was that of a woman seventy years of age who after gastric disturbance and subsequent transient Quincke's œdema of the tongue developed an œdema of the left optic papilla that lasted 2½ weeks. To judge from Cassiver's cases this was a case of

autointoxication. The subjective symptoms were the seeing of falling white leaves, later of dark spots. The symptoms disappeared completely at the end of 2½ weeks. They lasted so long because the metabolism could not carry on the resorption through the narrow bony canal as rapidly as elsewhere. Cerebral symptoms have often been observed in cases of acute circumscribed œdema the causes of which have been supposed to be transitory swellings in the cerebrum. The possibility of this sort of origin is confirmed by this case, and it is therefore one of general importance.

WILLIAMSON (576, **Homonymous quadrant anopsia**) found a quadrant defect in the fields of each eye downward and to the left. The patient was a man of sixty with evidences of arteriosclerosis. If one lesion is presupposed it must necessarily be located behind the chiasm, and the absence of associated symptoms except hallucinations of vision leads the author to believe that it lay in the calcarine fissure. Hemorrhage or embolism seems to be the most probable diagnosis.

ALLING.

STIEREN (577, **Surgical interference in choked disc**) enters a plea for the more general use of the decompression operation in cases of choked disc due to increased intracranial pressure. He favors opening of the skull and dura mater as soon as the diagnosis of pressure can be established, and instituting medical treatment afterward, in case the tumor can not be removed, as there is always a possibility of retrogression. Regarding the preservation of vision, much depends upon the appearance of the fundus previous to the operation. If there are signs of degeneration of the retina, especially at the macula, the prognosis is necessarily bad. Œdema of the nerve and retina, hemorrhages, and even large exudates may not be inconsistent with a good result. He relates three cases. 1. Jacksonian epilepsy with traumatic and specific history, choked disc, and headache. The latter were relieved by the operation but the epilepsy was not affected. 2. Sarcoma of the superior parietal convolution, Jacksonian epilepsy, choked disc, and paralysis of the right motor oculi. Two operations. Relief of paralysis and papillitis for two years. 3. Tumor of the right cerebral lobe arising in the optic thalamus. Convulsions, headache, choked disc, and sixth nerve

paralysis. Relief of paralysis and papillitis until death which occurred three years after. ALLING.

XXI.—INJURIES, FOREIGN BODIES, PARASITES.

578. CAUER. **Two cases of indirect rupture of the superior tarsus.** *Klin. Monatsbl. f. Augenheilkunde*, xlv., p. 80.

579. SHUMWAY, A. E. **Double perforations of the eyeball by metallic foreign bodies.** *Annals of Ophthalmology*, Oct., 1907.

580. LOPEZ, F. **History of a case of subretinal cysticercus.** *Annals of Ophthalmology*, Oct., 1907.

581. SNELL, SIMEON. **Wounds and injuries of the eyeball, eyelids, and orbit.** *British Medical Journal*, Dec. 7, 1907.

CAUER (578, **Two cases of indirect rupture of the superior tarsus**) saw two rare cases of rupture of the upper lid, one shortly after the other. The first injury was caused by a hanging iron curtain-rod, the second by a blow from a ring. Healing took place in both cases without the use of a suture.

SHUMWAY'S (579, **Double perforations of the eyeball by metallic foreign bodies**) case presented a typical history in that the eye after a double perforation became quiet for two weeks. Then a fresh inflammation appeared in the form of an iridocyclitis and an infection which passed back along the optic nerve to the meninges. The eye was enucleated, and the foreign body found behind the eyeball in the place indicated by the X-ray. ALLING.

LOPEZ (580, **History of a case of subretinal cysticercus**) successfully extracted a cysticercus which was under the retina near the optic nerve. Access to the posterior segment of the eyeball was obtained through a conjunctival wound above with tenotomy of the superior rectus. An incision was made in the sclera and then in the chorioid and the parasite was removed without rupture of the retina. The media remained transparent, but a large patch of chorioidal atrophy and nerve atrophy have reduced the vision to fingers.

ALLING.

SNELL (581, **Wounds and injuries of the eyeball, eyelids, and orbit**) in a Post-Graduate Lecture remarked that the subject was an important one to general practitioners, more especially with reference to Workmen's Compensation Acts. Wounds of the eyelids heal rapidly and for this reason if not

immediately and skilfully treated were apt to lead to great deformity. Exact apposition should be obtained, and the lid line exactly restored.

Blows. These can occasion immediate blindness, a fracture having occurred near the optic foramen. The chorioid may be ruptured with an intact globe. Proptosis may be caused by an orbital hemorrhage; or enophthalmos may result, but this is rare.

Injuries of the cornea. Slight traumata from foreign bodies common in many trades often lead to severe hypopyon ulcers. Snell cauterizes with a platinum cautery heated in a spirit lamp. Sympathetic ophthalmia can follow an ulcer of this kind. If a traumatic cataract follow penetration of a foreign body it is wise to wait till the inflammatory reaction has subsided before operation, but if hypotony supervene the lens matter must be evacuated. Some surgeons prefer to wait for absorption to remove the lens but Snell extracts.

Wounds of the sclerotic. Snell draws the edges together by a suture of the conjunctiva. An eye ruptures from a blow at its thinnest part, behind the corneo-scleral junction. Snell's experience is that these cases do badly. The eye shrinks and should then be removed early, as it is a menace to its fellow.

Foreign bodies. A deep-seated foreign body in the cornea may be removed by passing a keratome behind it, and using it as a background. If a foreign body has penetrated the globe it must be removed. The fact that the X-ray picture does not show a shadow of a piece of metal does not in all cases preclude the possibility of its presence. Snell is satisfied with his hand magnet. He finds that the later results of leaving a foreign body *in situ* are not good. He remarks that many varieties of steel now manufactured are non-magnetic. Manganese steel is diamagnetic, cromium steel is less magnetic than ordinary steel. Nickel steel is magnetic, but the addition of a little manganese renders it non-magnetic. One should always inquire as to the variety of steel under question.

Sympathetic ophthalmitis. This disease is less common than it was before antiseptics were used. If a wound of the ciliary region be cleared of all iris entanglement, it may be

saved; but a lost eye should be enucleated as soon as possible. Snell has had 4 cases in which the disease appeared in spite of enucleation. Only one case was of a mild character, the other three were practically lost. 7% of blind children in the Sheffield School for the blind owed their blindness to sympathetic ophthalmitis. T. HARRISON BUTLER.

XXII.—OCULAR DISTURBANCES IN GENERAL DISEASE.

Reviewed by Prof. HUMMELSHEIM, Bonn.

582. WIDMARK, J. **Three cases of toxic amblyopia with unusual etiology.** *Hygeia Sv. Laekaresaellsk. foerhandl.*, 1907, p. 6.

583. BUMKE, OSWALD. **Physiology and pathology of pupillary movements.** *Med. Klinik*, 1907, p. 1221.

584. FRENKEL, H. **Lumbar puncture in optic neuritis with cranial hypertension.** *Annales d'oculistique*, cxxxix., p. 1.

585. RODIET, A., PANSIER, P., and CAUS, F. **The treatment of concomitant lesions of the ocular apparatus in the therapeusis of epilepsy.** *Recueil d'ophtalmologie*, xxix., p. 625.

586. SCHIECK, F. **Albuminuric retinitis.** *Report of the Thirty-fourth Meeting of the Ophthalmological Society in Heidelberg*, 1907, p. 177.

587. TYCHSEN, C. **The prognostic importance of albuminuric retinitis.** *Hospitalstid*, 1907, p. 765.

588. COSMETTATOS. **Corneal complications of measles.** *Arch. d'ophtal.*, xxviii., p. 299.

589. LANDOLT, MARC. **The syndrome of Bitot.** *Arch. d'ophtalmologie*, xxviii., p. 29.

590. LANGMEAD, F. **A note on certain pupillary signs in chorea.** *Lancet*, Jan. 18, 1908.

WIDMARK (582, **Three cases of toxic amblyopia with unusual etiology**) reports three cases of toxic amblyopia, two caused by abuse of coffee, the third possibly by poisoning from paper containing arsenic. Recovery followed the discontinuance of coffee in the first two cases, and the administration of potassic iodide in the last. HELLGREN.

Dilatation of the pupil from psychic and sensory irritations is absent in about 60% of the cases of dementia præcox according to BUMKE (583, **Physiology and pathology of pupillary movements**). In katatonic stupor (A. Westphal) the pupils are sometimes transiently elliptic and react slowly or not at all. Similar disturbances are met with in hysteria in which absolute immobility of the pupil may occur, usually

with maximal mydriasis or myosis, in the latter case very frequently associated with spasm of the convergence. In one case Bumke ascribes the immobility of the pupil to reduction of the tonus of the sphincter by cocain and homatropin. Immobile dilated pupils also are present in simple fainting.

FRENKEL (584, **Lumbar puncture in optic neuritis with cranial hypertension**) observed complete recovery after two lumbar punctures in a patient twenty-one years of age who had neuroretinitis with choked disc, amblyopia, diplopia, ptosis, and photophobia. Two intramuscular injections of mercury were made before the lumbar punctures. Frenkel thinks that this was a case of serous meningitis accompanied by hysterical symptoms, blepharospasm, epileptic attacks, partial anæsthesias and hyperæsthesias and tachycardia. BERGER.

RODIET, PANSIER, and CAUS (585, **The treatment of concomitant lesions of the ocular apparatus in the therapeusis of epilepsy**) have examined the eyes in fifty cases of idiopathic epilepsy not during the attacks. After the attacks they always found a slight mydriasis frequently associated with anomalies of the light reflex (paradoxical reflex, hippus). In the fundus they found a venous hyperæmia, frequently with superficial hemorrhages in the papilla, which lasted for an hour or two, after bad attacks even as long as twelve hours. In the interval between attacks they found an irregular contraction of the visual field, frequently sector shaped, never hemianopic. The contraction of the visual fields was increased after the attacks. They also found pale papillæ and slight neuritic changes in cases in which the epilepsy had lasted a long time. BERGER.

SCHIECK (586, **Albuminuric retinitis**) describes clinically and anatomically two cases of retinitis albuminurica in pregnancy which go to show that the assumption of the etiological importance of serious vascular changes for the retinal disease is incorrect. Obliterating processes were either not present at all or present only in traces in the retinal vessels and in the vessels elsewhere in the body. The substance of the retina exhibited serious degenerative changes which he ascribed to a toxic action upon the retinal elements. Vascular changes favor the onset of the retinitis.

TYCHSEN (587, **The prognostic importance of albuminuric**

retinitis) has investigated sixty cases of nephritis in order to determine how long a patient may expect to live after albuminuric retinitis can be diagnosed. In his statistics he does not take into account the albuminuric retinitis of pregnancy nor the retinitis met with in acute infectious diseases. He finds that three fourths of the patients die within the first two years and the majority of these within the first year.

COSMETTATOS (588, **Corneal complications of measles**) observed during and following measles the bilateral keratitis exanthematica described by Trantas. Also, only following measles, one to thirty days after recovery, severe keratitis with ulceration, which in two cases went on to panophthalmitis and phthisis bulbi. In two cases the predominant microbes were pneumococci. In all the cases the keratitis was unilateral. In five cases there was perforation of the cornea with prolapse of the iris, in one ulcer of the cornea with hypopyon. In one case death occurred from meningitis.

BERGER.

MARC LANDOLT (589, **A note on certain pupillary signs in chorea**) observed in a working man twenty-nine years old, recently released from prison, hemeralopia and xerophthalmos, which he ascribed exclusively to insufficient nutrition. The lighting of the prison cells was good. BERGER.

LANGMEAD (590, **A note on certain pupillary signs in chorea**) has noticed the following conditions of the pupil in chorea:

Hippus. In severe cases of the ordinary sthenic type of chorea the iris movements are extraordinarily wide and rapid. This is explained by the jerky movements of the eyeballs, and the consequent varying amount of light which falls upon the retina, and is also due to the accommodation reflex for the many objects looked at.

Abnormal accommodation reflex. The reaction may be asynchronous on the two sides, one contracting while the other remains dilated.

This is especially the case when the pupils are unequal, the larger reacting more slowly.

Myosis. Contraction of the pupil to light and convergence is ill-sustained, and this fatigue may be unequal, one may tire out and dilate, the other remaining contracted.

Varying inequality of the pupils. One pupil may remain persistently smaller than the other during the complete examination; when next seen the condition may be reversed.

Eccentric pupils are occasionally present. These pupil signs are by no means uncommon. Langmead has found only the hippus, the abnormal accommodation reflex, and the eccentric pupils in articular rheumatism and chorea, which fact he thinks of interest as regards the common etiology of chorea and rheumatism.

T. HARRISON BUTLER.

BOOK REVIEWS.

I.—**Pulsating Exophthalmos.** By G. E. DE SCHWEINITZ and T. B. HALLOWAY. Philadelphia and London: W. B. Saunders Co. 124 pages. 1908. Price $2. Cloth.

This monograph is based on 69 cases not previously tabulated. Of these 69, 54 were traumatic, 13 were spontaneous. These new cases are analyzed with reference to etiology, symptoms, pathogenesis, diagnosis, prognosis, and treatment. The ligation of the superior ophthalmic vein has been practised seven times since 1897 with uniformly successful results. The authors conclude that this procedure should be considered before ligation of the carotid and certainly should precede ligation of the second carotid provided the first operation failed. A. K.

II.—**Lehrbuch des Augenheilkunde** (Text-book of Ophthalmology). By Prof. T. AXENFELD, Freiburg, Germany, with collaboration of Professors Bach, Bielschowsky, Elschnig, Greeff, Heine, v. Hippel, Krückmann, Peters, and Schirmer. 678 pages, 465 illustrations. G. Fischer: Jena, 1909. Price 14 M.

It is a new departure for a German text-book on ophthalmology to be written by a number of authors. The division of the subject-matter has been skilfully assigned to those who, with a few exceptions, are at present directing the tendencies of modern ophthalmology in Germany. The authors are moreover all actively engaged in teaching; many of them have written on the same subject treated in this book as in the monumental Handbook of Graefe-Samisch, 2d edition. As this book is especially designed for students the examination of the eye and the functional examination

are extensively treated. Special chapters are devoted to a general introduction to treatment, to ophthalmoscopic differential diagnosis, and to the eye in relation to general diseases. Many of the individual chapters are models in the successful treatment of the subject. Too much praise cannot be given to the excellency of the illustrations, most of which are in colors. The authors and the publishers are to be congratulated on this achievement which reflects credit not only on German ophthalmology but on German bookmaking.

A. K.

III.—**Diathesis and Ocular Diseases.** By A. MAITLAND RAMSEY, M.D., Glasgow. Pp. 184. London: Baillière, Tindall & Cox. 1909.

These clinical lectures, delivered at the Glasgow Ophthalmic Institution, represent the author's personal experience and aim to emphasize the important influence of diathesis on many diseases of the eye. The writer is well known from his previous contributions to clinical ophthalmology. The importance of general medical knowledge in the recognition and proper treatment of eye diseases cannot be too forcibly dwelt upon in these days of specialties.

The arthritic diathesis takes up the greater part of the book as chronic rheumatism and gout are responsible for many eye diseases. The importance of a careful examination of the urine is insisted upon, and the author wisely urges that in doubtful cases the services of an expert should be obtained. The eye lesions related to arthritism are divided into the following groups: 1. Conjunctiva and sclera. 2. Uvea. 3. Retina and optic nerve. 4. Glaucoma. The perusal of this book, written in an easy and attractive style, will be found interesting and suggestive.

A. K.

Fig. 1.

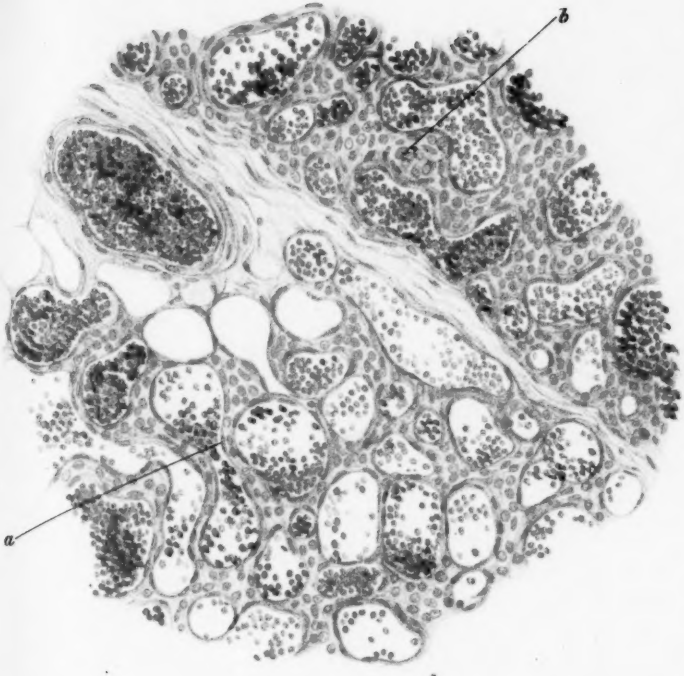
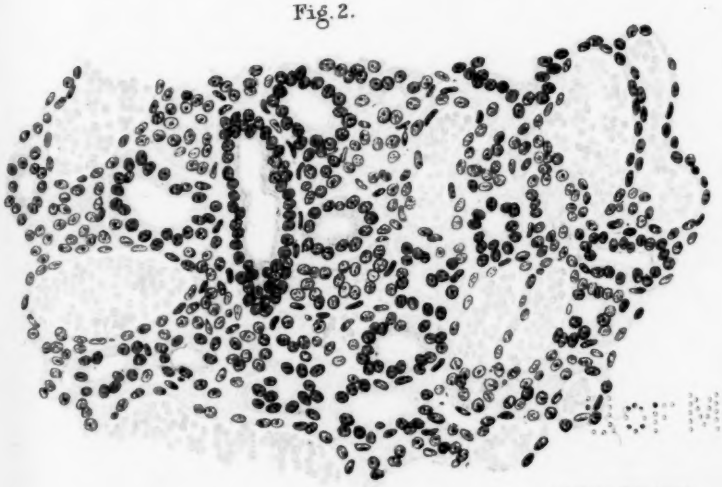


Fig. 2.



A. Kirchner, Leipzig gez.

Watanabe, Ueber einen Fall von Endothelioma intravasculare der Orbita.

Verl. v. J. F. Bergmann, Wiesbaden.

Kgl. Univers.-Druckerei v. H. Stürtz, Würzburg.